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Federal Supremacy Versus Legitimate State Interests in Nuclear Regulation: Pacific Gas & Electric and Silkwood

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FEDERAL SUPREMACY VERSUS LEGITIMATE STATE INTERESTS IN NUCLEAR REGULATION: *PACIFIC GAS & ELECTRIC* AND *SILKWOOD*

The development of nuclear power for the commercial production of electricity over the past thirty years has created complex and deep-seated tensions between the federal government and the states regarding the scope of their respective regulatory authority.[1] Although nuclear power originally was a creation of the federal government and Congress historically has been interested in its development as a means of meeting the nation's energy needs,[2] the effects of nuclear power production reach deeply into territory traditionally regulated by the states, such as public health and safety, environmental protection, land use and public utility planning.[3] The extraordinary hazards to the environment and to human

1. For a detailed historical overview of the development and regulation of nuclear power by the federal government, see generally D. FORD, THE CULT OF THE ATOM: THE SECRET PAPERS OF THE ATOMIC ENERGY COMMISSION (1982). For constitutional analyses of state efforts to regulate nuclear energy prior to the United States Supreme Court's decisions in Pacific Gas & Elec. Co. v. State Energy Resources Conservation & Dev. Comm'n (PG & E), 103 S. Ct. 1713 (1983) and Silkwood v. Kerr-McGee Corp., 104 S. Ct. 615 (1984), see Murphy & La Pierre, *Nuclear "Moratorium" Legislation in the States and the Supremacy Clause: A Case of Express Preemption*, 76 COLUM. L. REV. 392 (1976); Tribe, *California Declines the Nuclear Gamble: Is Such a State Choice Preempted?*, 7 ECOLOGY L.Q. 679 (1979); Wiggins, *Federalism, Balancing and the Burger Court: California's Nuclear Law as a Preemption Case Study*, 13 U.C.D. L. REV. 1 (1979-80).

2. Nuclear power was originally developed during the early and mid-1940's through the top secret executive branch "Manhattan Project." The exclusive purpose and effect of that project was to develop the first atomic weapons, which were eventually used against Imperial Japan in August 1946. *See generally* D. FORD, *supra* note 1, at 25-31. Under the first legislative scheme for civilian oversight of nuclear energy development, the Atomic Energy Act of 1946, ch. 724, 60 Stat. 755, the development of atomic weapons remained the nearly exclusive focus of the nuclear energy program. *See* D. FORD, *supra* note 1, at 31-36; *see also infra* notes 35-39 and accompanying text. In 1954, Congress passed the Atomic Energy Act (AEA), ch. 1073, 68 Stat. 919 (codified as amended at 42 U.S.C. §§ 2011-2296 (1982), which established the basic framework for the commercial development of nuclear energy in the United States. The AEA, in addition to furthering the development of nuclear weapons, *see* 42 U.S.C. §§ 2121-2122 (1982), also evidenced a firm commitment on the part of Congress to foster the development of nuclear power for commercial use. *See* 42 U.S.C. §§ 2011-2013 (1982). *See infra* notes 40-43 and accompanying text; *see also* Northern States Power Co. v. Minnesota, 447 F.2d 1143, 1147-48 (8th Cir. 1971), *aff'd mem.*, 405 U.S. 1035 (1972).

3. Among the traditional police powers of the states is protection of health, safety and

life and health involved in producing, transporting, using and disposing of radioactive materials[4] elevate the potential conflict between state and federal interests to levels of intensity not found in other areas where state and federal interests may conflict.[5] Specifically, the hazards of nuclear operations counterpose a state's legitimate interests in protecting residents and resources[6] against the federal government's legitimate interest in developing a vast and relatively new source of energy.[7]

In recent years, the conflict between the federal government and the

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the environment. *See generally* Note, *A Framework for Preemption Analysis*, 88 YALE L.J. 363, 374-75 (1978); *see also infra* note 132 and accompanying text. Public health and safety and environmental quality are potentially threatened by the extraordinary toxicity of the radioactive materials used in nuclear reactors. These radioactive materials emit subatomic particles which will permeate living cells and can destroy them or make them cancerous. *See infra* notes 55-56 and accompanying text. Some of the radioactive materials used in nuclear plants, such as plutonium, are the most hazardous substances known. *See* Silkwood v. Kerr-McGee, 667 F.2d at 913. Radioactive materials in a nuclear plant could be released into the environment if the containment structures of the plant were breached during an accident. *See infra* notes 58-65 and accompanying text. Most of the wastes produced by nuclear reactors remain toxic for more than a thousand years, and some remain toxic for more than a million years. *See* California State Assembly Committee on Resources, Land Use and Energy, *Reassessment of Nuclear Energy in California: A Policy Analysis of Proposition 15 and its Alternatives* 67-69 (1976) [hereinafter cited as *Reassessment Report*]. Hence, nuclear wastes will remain a hazard to public health and safety, and the environment unless means are developed for their permanent disposal. No such means have yet been developed. *See PG & E*, 103 S. Ct. 1713, 1717-18 (1983); *see also infra* notes 66-71 and accompanying text.

States also have well-established authority over economic aspects of electric power generation, such as utility rate-setting and planning for future energy consumption. *See* Tribe, *supra* note 1, at 702. In recent years, nuclear power development has had a substantial effect on the economic interests of the states as a result of astronomical cost overruns in the construction of nuclear plants. *See infra* notes 255-59 and accompanying text. The continuing absence of a means to permanently dispose of nuclear wastes also poses serious economic problems for states, including the threat of plant shutdowns as temporary storage facilities become filled. *See PG & E*, 103 S. Ct. at 1718.

4. *See supra* note 3 and *infra* notes 55-56, 66-71 and accompanying text.

5. The level of intensity involved in the dispute between the states and the federal government over authority to regulate the nuclear power industry is illustrated by the fact that in *PG & E*, the United States filed an amicus brief attacking California's right to impose controls on nuclear power within the state, while 17 states filed amicus briefs supporting California's right to impose such controls. *See* Amicus Brief of the United States supporting reversal; Amicus Brief of the States of Alaska, Arizona, Arkansas, Hawaii, Kansas, Louisiana, Minnesota, Mississippi, Montana, Nevada, New York, Ohio, Oklahoma, South Carolina, Vermont, West Virginia, and Wyoming supporting affirmance; and Amicus Brief of Maine supporting affirmance.

6. *See supra* note 3 and *infra* note 132 and accompanying text.

7. The interest of the federal government in encouraging development of a variety of energy sources including nuclear energy to promote the general welfare and the common defense of the nation was emphasized by Congress in the policy and purposes provisions of the Energy Reorganization Act of 1974, 42 U.S.C. § 5801(a) & (b) (1982).

states over the regulation of nuclear power has been played out increasingly in the courts, where the primary issues have been the extent and the scope of Congress' intent to preempt state regulation.[8] Prior to 1954, the federal government monopolized nuclear power, which was devoted primarily to military applications.[9] Through the Atomic Energy Act of 1954 (AEA),[10] which established the basic framework for the production and use of radioactive materials in the United States, Congress opened the door to private commercial development of nuclear energy and manifested an intent to promote such development. At the same time, the AEA required that this development be limited by considerations of national security and public health and safety.[11]

The AEA, as originally passed, gave responsibility for both the promotion of nuclear power and its regulation to one agency, the Atomic Energy Commission (AEC).[12] It provided, however, that existing state authority to regulate the generation, sale and transmission of electricity would not be affected where electricity was produced by nuclear plants.[13] In 1959, Congress amended the AEA to provide for a more explicit state role in nuclear safety regulation.[14] Later, in response to criticism that the AEC was too much the promoter and not enough the regulator of the nuclear power industry, Congress separated the functions of the AEC, delegating promo-

8. *See, e.g.*, Silkwood v. Kerr-McGee, 104 S. Ct. 615 (1984); *PG & E*, 103 S. Ct. 1713 (1983); McKay v. United States, 703 F.2d 464 (10th Cir. 1983); Northern States Power Co. v. Minnesota, 447 F.2d 1143 (8th Cir. 1971), *aff'd mem.*, 405 U.S. 1035 (1972); Marshall v. Consumers Power Co., 65 Mich. App. 237, 237 N.W.2d 266 (1975).

9. *See supra* note 2 and *infra* notes 35-39 and accompanying text.

10. Ch. 1073, 68 Stat. 919 (codified as amended at 42 U.S.C. §§ 2011-2296 (1982)).

11. *See* 42 U.S.C. § 2012(d) (1982) ("The processing and utilization of . . . nuclear material must be regulated in the national interest and in order to provide for the common defense and security and to protect the health and safety of the public"); 42 U.S.C. § 2013 (1982) ("It is the purpose of this chapter to effectuate the policies set forth above by providing for . . . (d) a program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public").

12. The Atomic Energy Act of 1954, ch. 1073, §§ 21-28, 68 Stat. 919, 924-27. *See* Henderson, *The Nuclear Choice: Are Health and Safety Issues Pre-empted?*, 8 B.C. ENVTL. AFFAIRS L. REV. 821, 826 (1980).

13. Ch. 1073, § 271, 68 Stat. 960 (codified as amended at 42 U.S.C. § 2018 (1982)).

14. Act of Sept. 23, 1959, Pub. L. No. 86-373, § 1, 73 Stat. 688 (codified as amended at 42 U.S.C. § 2021 (1982)). The amendment permitted the AEC to enter into an agreement ("turnover agreement") with the governor of any state to provide for state assumption of regulatory control of certain types of radioactive materials and nuclear operations. 42 U.S.C. § 2021(b) (1982). The statute required the AEC to retain control over hazardous matters including construction and operation of nuclear plants, 42 U.S.C. § 2021(c) (1982), but provided that this did not affect state authority to control activities for purposes other than radiation safety. 42 U.S.C. § 2021(k) (1982). *See infra* notes 95-106 and accompanying text.

tion to what is now the United States Department of Energy, and regulation to the Nuclear Regulatory Commission (NRC).[15] At various times since, Congress has clarified and expanded the states' regulatory authority.[16]

Additionally, Congress indirectly affected the respective regulatory spheres of the state and federal governments by amending the AEA through the Price-Anderson Act in 1957. That amendment limited the total liability that can be incurred as a result of any nuclear accident to $560 million,[17] thereby altering state tort remedies for major nuclear accidents.[18] Other than setting a limit upon potential liability, however, the Price-Anderson Act left intact traditional state remedies for injuries caused by nuclear operations.[19]

During the thirty-year history of the nuclear energy program, some of the basic assumptions about nuclear energy have changed. When Congress passed the AEA in 1954, it assumed that nuclear power could be developed both safely and inexpensively.[20] Accidents such as those that occurred at Browns Ferry, Alabama, and Three Mile Island, Pennsylvania, have demonstrated the seriousness of certain safety problems relating to nuclear reactors.[21] Major overruns in the cost of constructing nuclear plants, and resulting increases in utility rates, have undermined the as-

15. The Energy Reorganization Act of 1974, Pub. L. No. 93-438, 88 Stat. 1233 (codified as amended at 42 U.S.C. §§ 5801-5891 (1982)), abolished the AEC, 42 U.S.C. § 5814(a) (1982), and transferred its research and development functions to the Energy Research and Development Administration (ERDA), 42 U.S.C. §§ 5811-5820 (1976 & Supp. V 1981), and its regulatory functions to the Nuclear Regulatory Commission (NRC), 42 U.S.C. §§ 5841-5879 (1976 & Supp. V 1981). The ERDA was subsequently abolished and its functions were transferred to the Department of Energy (DOE) by the Department of Energy Organization Act of 1977, Pub. L. No. 95-91, 91 Stat. 567 (codified as amended at 42 U.S.C. §§ 7101-7375 (1982)). Both the ERDA and the DOE were required to promote the development of a broad spectrum of energy sources including solar energy. 42 U.S.C. § 5801(a) and (e) (1982). *See infra* notes 95-106 and accompanying text.

16. *See infra* notes 103-09 and accompanying text.

17. Pub. L. No. 85-256, 71 Stat. 576 (codified as amended at 42 U.S.C. § 2210 (1982)). The $560 million liability limit is provided for in § 2210(e).

18. State tort remedies otherwise available would necessarily be reduced for accidents in which damages exceeded $560 million. *See* 42 U.S.C. § 2210(e) (1982). The Act also places limitations on the proportional share of the recovery that any one claimant may receive when the total claims exceed $560 million. *Id.*

19. *See infra* notes 47-53 and accompanying text.

20. Congress required that nuclear materials be handled safely, but did not specify any particular safety criteria. It assumed that AEC would be able to enforce adequate safety requirements. *See* 42 U.S.C. § 2201(b) (1982); *see also* D. FORD, *supra* note 1, at 42-43; *infra* notes 44-47 and accompanying text.

21. *See infra* notes 58-63 and accompanying text.

sumption that nuclear energy can be produced inexpensively.[22] The continuing absence of a means to dispose permanently of the highly toxic radioactive wastes produced by nuclear plants has become a further threat to nuclear power development, involving both economic and safety considerations.[23] This threat is especially serious in view of the extremely long period during which radioactive wastes retain their toxicity.[24]

The economic, health, safety and environmental problems associated with nuclear power affect vital state interests such as making electricity available at reasonable rates and protecting residents and natural resources from radiation damage. Seeking to further these interests, states have regulated various aspects of nuclear power, including its health, safety and environmental effects, virtually from the beginning of the nuclear energy program.[25] In the 1970's and early 1980's, several states, including California, passed laws extensively regulating the nuclear industry.[26] At the same time, individuals in various parts of the United States filed lawsuits alleging that the operation of nuclear facilities had harmed them.[27]

The United States Supreme Court recently decided two cases dealing with federal preemption of state law in the nuclear energy area. In *Pacific Gas & Electric Co. v. State Energy Resources Conservation & Development Commission (PG & E)*, the Court addressed the issue whether the AEA preempted a California statute prohibiting the construction of new nuclear power plants in the state until a means of permanently disposing of nuclear wastes had been developed.[28] Specifically, the Court considered whether the state moratorium contravened an asserted intent of Congress to reserve nuclear safety regulation exclusively to the federal government.[29] The Court upheld the constitutionality of the state law, but did so on narrow grounds. It held that Congress had occupied the field of radiation safety, precluding the states from regulating in that area, but that the California statute had an economic rather than a radiation safety purpose,

22. *See infra* notes 254-58.

23. *See infra* notes 66-71 and accompanying text.

24. High-level radioactive wastes from reactors remain toxic for thousands and in some cases millions of years. *See supra* note 3 and *infra* notes 67-68 and accompanying text.

25. By 1959, 29 states had adopted regulatory measures related to nuclear energy. *See infra* notes 87-89 and accompanying text.

26. *See infra* notes 110-20 and accompanying text.

27. *See, e.g.*, Silkwood v. Kerr-McGee Corp., 104 S. Ct. 615 (1984); McKay v. United States, 703 F.2d 464 (10th Cir. 1983); Van Dissel v. Jersey Cent. Power & Light Co., 181 N.J. Super. 516, 438 A.2d 563 (App. Div. 1981); Marshall v. Consumers Power Co., 65 Mich. App. 237, 237 N.W.2d 266 (1975); *see also infra* notes 195-226 and accompanying text.

28. 103 S. Ct. 1713 (1983).

29. *Id.*

and consequently was not preempted by the AEA.[30]

In *Silkwood v. Kerr-McGee Corp.*, the Court examined federal preemption of nuclear regulation in the context of a suit between private parties arising under state tort law.[31] It considered whether an award of punitive damages, under state law, for radiation injuries suffered by an employee of a nuclear fuel production plant contravened the intent of Congress to delegate nuclear safety regulation to the NRC.[32] In *Silkwood*, as in *PG & E*, the Court found no preemption of the state law.[33] It reasoned that despite Congress' intent to displace state nuclear safety regulation in general, Congress did not intend to displace traditional state tort remedies in cases involving radiation injuries.[34]

This Comment reviews the history of nuclear power regulation by the federal and state governments and discusses the constitutional basis for challenging state regulation on preemption grounds. It examines the Supreme Court's preemption reasoning in *PG & E* and *Silkwood*. The Comment then assesses the extent to which Congress has manifested an intent to displace state nuclear energy laws and maintains, contrary to the conclusion reached by the Supreme Court, that Congress did not intend to displace state nuclear safety regulation. In light of the significant shift since 1954 in assumptions about the benefits versus the risks of nuclear energy, the Comment concludes that sound public policy favors a strong state role in regulating nuclear power for a variety of purposes, including protection of the public's safety. Further, after assessing the future of nuclear energy regulation in the wake of *PG & E* and *Silkwood*, it further concludes that the states will have broad authority to regulate nuclear energy, including radiation safety. The Comment suggests that the reasoning of the majority opinions in *PG & E* and *Silkwood* will engender unnecessary confusion and litigation. It urges the adoption of an amendment to the Atomic Energy Act that would avert this confusion and conflict by providing explicitly that the states have the authority to regulate nuclear materials and facilities except when their regulations would conflict directly with federal law.

30. *Id.* at 1726, 1729.
31. 104 S. Ct. 615 (1984).
32. *Id.*
33. *Id.*
34. *Id.* at 617, 622, 624-25.

I. GOVERNMENT REGULATION OF NUCLEAR POWER

A. The Federal Scheme

In 1946, Congress enacted the first statute governing nuclear power development.[35] That statute maintained the federal government's monopoly over all fissionable materials and atomic energy facilities that had been established earlier by the executive branch in the top-secret "Manhattan Project."[36] The Act's primary purposes were to develop nuclear energy for military uses and to protect national security in the production and use of fissionable materials.[37] Commercial use was not emphasized, and private ownership of nuclear facilities or materials was prohibited.[38] The 1946 Act created the Atomic Energy Commission (AEC) to oversee nuclear power development.[39]

Despite the military and national security emphasis of the original atomic energy statute, various members of the scientific community, the press, and the executive branch recognized the potential use of atomic energy for commercial production of electricity and pressed that goal before Congress.[40] In 1954, Congress passed the Atomic Energy Act (AEA) gov-

35. The Atomic Energy Act of 1946, ch. 724, 60 Stat. 755. The Act later was replaced by the Atomic Energy Act of 1954, ch. 1073, 68 Stat. 919 (codified as amended at 42 U.S.C. §§ 2011-2296 (1982)).

36. The "Manhattan Project" was the secret United States military research and development effort during World War II that culminated in the production of the first atomic weapons. *See generally* D. FORD, *supra* note 1, at 27-29.

37. Atomic Energy Act of 1946, ch. 724, §§ 1-2, 60 Stat. 755-58. *See* D. FORD, *supra* note 1, at 32.

38. Atomic Energy Act of 1946, ch. 724, §§ 4(c)(1), 5 (a)(2), 60 Stat. 759, 760. Section 4(c)(1) permitted a limited exception for the private ownership of nuclear facilities if the facilities were useful in research and did not have the potential to produce a sufficient quantity of fissionable material for the production of an atomic bomb.

39. *Id.* § 2, 60 Stat. 755-58.

40. Support for private development was widespread. Various members of the scientific community and the press, among others, made outspoken predictions about the utopian benefits that could be achieved by the development of an energy source that would be "too cheap to meter." *See generally* D. FORD, *supra* note 1, at 29-31, 40-41, 50. The prediction that electricity produced by atomic energy would be "too cheap to meter" was made by AEC Chairman Lewis Strauss in 1954. Strauss, Remarks Prepared for Delivery at Founder's Day Dinner, National Association of Science Writers, New York City (Sept. 16, 1954) *quoted in* D. FORD, *supra* note 1, at 50.

In early 1954, President Eisenhower sent a message to Congress, accompanying a bill destined to become the AEA, in which he predicted:

> The destiny of all nations during the Twentieth century will turn in large measure upon the nature and the pace of atomic energy development here and abroad. The [legislation] herein recommended will help make it possible for American atomic energy development, public and private, to play a full and effective part in leading mankind into a new era of progress and peace.

Dwight D. Eisenhower, Message From the President Transmitting Recommendations Rela-

erning nuclear materials and facilities.[41] The Act both furthered production of atomic weapons and established the basic framework for private, commercial development of nuclear power.[42] The introductory sections of the AEA manifested the clear intent of Congress to promote the development of commercial nuclear power.[43] The AEA gave the AEC the role of promoting the development of commercial nuclear power and regulating it to assure national security and to safeguard public health and safety.[44] The regulatory authority of the AEC was to be exercised primarily through the licensing of nuclear facilities and operations. Detailed licensing procedures were set forth in the statute.[45] The Act also gave the AEC general authority to issue health and safety regulations[46] but set no specific safety guidelines, leaving the development of safety standards entirely to the AEC. The legislative history indicates that in 1954 Congress gave little

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tive to the Atomic Energy Act of 1946, H.R. DOC. NO. 328, 83d Cong., 2d Sess. 8 (1954), *reprinted in* U.S. ATOMIC ENERGY COMMISSION, LEGISLATIVE HISTORY OF ATOMIC ENERGY ACT OF 1954, at 45, 52.

41. Atomic Energy Act of 1954, ch. 1073, 68 Stat. 919 (codified as amended at 42 U.S.C. §§ 2011-2296 (1982)).

42. 42 U.S.C. §§ 2011-2013, 2121-2122 (1982).

43. The introductory sections of the AEA, setting out the Act's policies and purposes, indicated that the objective of Congress was to promote the development of nuclear energy beyond the exclusive ownership and control originally vested in the federal government. For example, § 1 of the Act provides:

> Atomic energy is capable of application for peaceful as well as military purposes. It is therefore declared to be the policy of the United States that (a) the development, use, and control of atomic energy shall be directed so as to make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security; and (b) the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and *strengthen free competition in private enterprise.*

42 U.S.C. § 2011 (1982) (emphasis added). Also, § 2 as amended provides in part:

> The Congress of the United States makes the following findings concerning the development, use, and control of atomic energy. . . (i) In order to protect the public and to encourage the development of the atomic energy industry . . . the United States may make funds available for a portion of the damages suffered by the public from nuclear incidents, and may limit the liability of those persons liable for such losses.

42 U.S.C. § 2012 (1982).

44. Under the AEA, the functions of the AEC in promoting the private nuclear power industry included conducting research and development, the results of which were to be shared with the industry, 42 U.S.C. §§ 2052, 2053 (1982); funding research and development projects by the industry, *id.* § 2051; and providing the industry with nuclear fuel, *id.* §§ 2073(c) & (d), 2074(a) & (b). *See also* D. FORD, *supra* note 1, at 46-47.

45. The AEC was required to license prospective operators of nuclear power plants before they could begin construction and before they could begin operation. 42 U.S.C. §§ 2131-2140 (1982).

46. *Id.* § 2201(p).

consideration to the nuclear safety issue.[47]

As the new nuclear power industry prepared to become operational, the industry itself became concerned enough about the possibility of a catastrophic accident at a nuclear facility to press Congress for new legislation limiting its liability in the case of such an accident.[48] Congress responded to this concern in 1957 by passing the Price-Anderson Act.[49] That Act amended the AEA by setting a $560 million limit on the total liability that might be incurred as the result of any one nuclear accident.[50] It also required the federal government to indemnify the operator of the nuclear plant for most of that amount and established a mechanism for prorating awards in instances in which claims exceeded $560 million.[51] However, the Price-Anderson Act did not purport to establish federal substantive law under which to decide claims against the operators of nuclear facilities.[52] Thus, the Act left state tort remedies for harm resulting from the operation of nuclear facilities essentially intact.[53]

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47. The Joint Committee on Atomic Energy, which conducted the congressional hearings on the AEA prior to its passage in 1954, did not call a single witness to testify on radiation safety issues, although that committee had earlier heard expert testimony concerning radiation safety. *See* D. FORD, *supra* note 1, at 42-43. According to former AEC attorney Harold Green, there is not a single reference to specific radiation safety considerations in the legislative history of the AEA. In explaining this omission, Green stated, "Nobody really ever thought that safety was a problem. They assumed that if you just wrote the requirement that it be done properly, it would be done properly." Interview with Harold P. Green, *quoted in* D. FORD, *supra* note 1, at 41-42.

48. *See* Murphy & La Pierre, *supra* note 1, at 405; D. FORD, *supra* note 1, at 44. In 1956, a representative of Westinghouse Corporation, one of the primary designers and builders of nuclear reactors, testified before Congress' Joint Committee on Atomic Energy that if Westinghouse had to accept the risk of liabilities resulting from a nuclear accident, it would pull out of the nuclear power business. *Government Indemnity for Private Licensees and A.E.C. Contractors Against Reactor Hazards, Hearings Before the Joint Comm. on Atomic Energy*, 84th Cong., 2d Sess. 47 (1956), *noted in* D. FORD, *supra* note 1, at 44.

49. Price-Anderson Act, Pub. L. No. 85-256, § 4, 71 Stat. 576 (1957) (codified as amended at 42 U.S.C. § 2210 (1982)).

50. 42 U.S.C. § 2210(e) (1982). A study by the NRC estimated that a "worst case" accident at a commercial nuclear reactor could result in $14 billion in property damage as well as 3300 deaths. U.S. Nuclear Regulatory Commission, Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants, NUREG-75/014 (1975), *cited in Reassessment Report, supra* note 3, at 31, 42-50. Thus, the Price-Anderson $560 million liability cap would limit recovery in a "worst case" accident to approximately 4% of the property damage that the NRC has estimated could result. A more recent study done for the NRC by Sandia National Laboratories estimated possible loss of life and property damage resulting from a "worst case" accident at much higher levels than the estimates made in the earlier NRC study. *See Nuclear Study Raises Estimates of Accident Tolls*, Wash. Post, Nov. 1, 1982, at A1.

51. 42 U.S.C. § 2210(c) & (o) (1982).

52. *See* Silkwood v. Kerr-McGee, 104 S. Ct. 615, 623-25 (1984).

53. *Id.*

In the 1960's and 1970's, as the number of operating nuclear plants grew from two to more than seventy,[54] public concern over nuclear safety, the long-term environmental and health effects of radiation, and economic problems faced by the nuclear power industry mounted. Among the most important and highly publicized concerns were reactor safety and the permanent disposal of nuclear wastes. With respect to both the safe operation of nuclear reactors and the management of nuclear wastes, the public became concerned primarily with the possibility that radioactive materials could escape into the environment, threatening human life and health.[55] Although low-level exposure of human cells to radiation is not necessarily hazardous to human health,[56] higher levels of exposure can result in cancer and genetic damage, while still higher levels result in death.[57]

Incidents at nuclear plants in the 1970's triggered widespread fears that a major radiation accident could result from a safety system failure.[58] The

54. *See* D. FORD, *supra* note 1, at 58, 229.

55. *See generally Reassessment Report, supra* note 3, at 31-58, 67-71. Radioactive materials are highly toxic—carcinogenic, mutagenic, and with sufficient exposure almost immediately fatal. *See generally* Holdren, *Hazards of the Nuclear Fuel Cycle*, 30 BULL. OF ATOMIC SCIENTISTS 14 (1974); NATIONAL ACADEMY OF SCIENCES, THE EFFECTS ON POPULATION OF EXPOSURE TO LOW LEVELS OF IONIZING RADIATION (1980); Bair, *Toxicology of Plutonium*, in 4 ADVANCES IN RADIATION BIOLOGY 255 (1974). Some radioactive materials, such as plutonium, a synthetic element used in nuclear weapons and reactors and present in reactor wastes, are among the most highly toxic substances known. The toxicity of nuclear materials results from their emission of subatomic particles which will permeate living cells. *See* Silkwood v. Kerr-McGee, 667 F.2d at 911.

56. *See* Silkwood v. Kerr-McGee, 667 F.2d at 913.

57. *See Reassessment Report, supra* note 3, at 32-33.

58. *See generally id.* at 35, 50-58. The central feature of nuclear reactors such as those used in the United States is a reactor "core" in which there are "fuel rods" containing materials such as plutonium and enriched uranium. *See id.* at 15. The radioactive fuels in the core undergo a controlled nuclear chain reaction in which neutrons from atoms of the fuel bombard other such atoms releasing more neutrons and generating heat. *Id.* at 14. The heat boils water, which is used to turn turbines that generate electricity. *Id.* at 16. In boiling water reactors, the heat in the reactor core produces steam that drives the turbines. In pressurized water reactors, a sealed, pressurized water system initially absorbs the heat which is transferred to a secondary water system to drive the turbines. *Id.* Escape of high levels of radiation into the environment is prevented by the alloy rods in which the fuel is placed and other barriers including an outer concrete wall. *Id.* at 15, 35.

The nuclear reaction in the core is kept under control by a neutron-absorbing substance. *Id.* To terminate the chain reaction, rods containing such a substance are dropped into the core. Dropping the control rods into the reactor to halt the chain reaction is referred to as "scramming" the reactor. *Id. See also* D. FORD, *supra* note 1, at 28. When these control rods are inserted into the core, however, even greater heat than that generated by the operation of the reactor is produced. *See Reassessment Report, supra* note 3, at 15, 33. Core cooling systems, consisting primarily of circulating water, are used to keep the heat level under control both during normal operation and during a shutdown. *Id.* at 35-37. The cooling systems are designed to totally submerge the reactor core in water. *Id.* If a cooling system malfunctions, the reactor core can overheat immensely, resulting in a "meltdown" in

two safety-related failures that received the greatest public attention were the Browns Ferry, Alabama, incident in 1975 and the Three Mile Island, Pennsylvania, incident in 1979. At Browns Ferry, an electrical fire broke out in a reactor while a worker was using a candle to check for air leaks. The fire burned for seven hours, causing the emergency core cooling system to become non-operational, filling the control room with smoke, and permitting the water level covering the core of one reactor to become abnormally low.[59]

The accident at Three Mile Island in March 1979 involved an uncontrolled loss of core cooling water caused by a combination of human error, mechanical malfunction and instrument inadequacy.[60] The fuel overheated and the reactor core came within thirty to sixty minutes of a "meltdown."[61] In the wake of the accident at Three Mile Island, numerous defects in nuclear plant safety systems and in the NRC's safety oversight procedures were uncovered and thoroughly documented by a presidential commission.[62]

A recent study performed for the NRC concluded that a "worst case" accident at a nuclear plant could result in as many as 100,000 deaths within a year and as much as $300 billion in damage.[63] The NRC has

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which the heat will cause the metal and concrete containment barriers to be breached, thereby releasing large quantities of radioactive materials into the environment. *Id.* at 33-37.

59. *See id.* at 53; D. FORD, *supra* note 1, at 217-23.

60. *See* D. FORD, *supra* note 1, at 230-31.

61. *Id.* at 231. For the definition of a "meltdown" accident, see *supra* note 58.

62. Report of the President's Commission on the Accident at Three Mile Island (1979). The report disclosed errors ranging from improper installation of control room instruments so that they could not be read, to the NRC's lack of a comprehensive system to monitor safety at nuclear reactors. *See* D. FORD, *supra* note 1, at 231.

63. *Nuclear Study Raises Estimates of Accident Tolls*, Wash. Post, Nov. 1, 1982, at A1. The study was conducted for the NRC by Sandia National Laboratories and was based on a computer model that used population, meteorological and economic data to compute the effects of a variety of possible accident scenarios at each of the 80 nuclear plant sites in the United States. The estimate of 100,000 "early" deaths (within a year) applied to a "worst case" accident at the Salem, New Jersey, nuclear power plant near Wilmington, Delaware. The estimate of $300 billion in property damage applied to a "worst case" accident at the Indian Point 3 reactor near New York City. *Id.* The study showed, however, that the potential number of fatalities and the potential amount of property damage would vary greatly from one nuclear plant to another, and from one time to another, depending primarily on population density near the plant, the effectiveness of evacuation plans, and meteorological conditions. The study showed that potential loss of life and property damage would be much less in a reactor located in a relatively unpopulated area. *Id.* The lowest estimate for early deaths in the event of a "worst case" accident was 173 at the WPPSS 3 reactor near Olympia, Washington. The lowest estimate for property damage in the event of a "worst case" accident was $13 billion. *Id.* An earlier study conducted by the NRC concluded that a "worst case" accident would result in a loss of 3300 lives and $14 billion in property

estimated that there is only about a two percent probability that such an accident could occur before the year 2000.[64] However, the methods by which the NRC has made such estimates have been seriously questioned, particularly after the Three Mile Island accident.[65]

Aside from reactor safety, probably the most serious and most publicized of the safety and environmental concerns about nuclear power has been how to dispose of the high-level radioactive wastes that nuclear plants produce. Like nuclear fuels, these wastes are highly toxic.[66] High-level wastes remain toxic for 1000 years or more,[67] and some of their radioactive substances remain toxic for a million years.[68] No means to dispose of the wastes has been developed, and it is unlikely that any will be developed in the near future.[69] The wastes have been stored in temporary facilities at reactor sites.[70] Many of these temporary storage facilities have been filled almost to capacity, threatening possible reactor shutdowns with serious economic consequences.[71]

Public concern over reactor safety, waste disposal and other problems

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damage. U.S. Nuclear Regulatory Commission, Reactor Safety Study, WASH-1400, NUREG-75/014 (1975), *cited in Reassessment Report, supra* note 3, at 42-43.

64. *Nuclear Study Raises Estimates of Accident Tolls, supra* note 63.

65. *See* Yellin, *High Technology and the Courts: Nuclear Power and the Need for Institutional Reform*, 94 HARV. L. REV. 489, 527-28 & n.235 (1981).

66. *See id.* at 533-34.

67. *See PG & E*, 103 S. Ct. at 1718; *Reassessment Report, supra* note 3, at 67-69.

68. *Reassessment Report, supra* note 3, at 68-69.

69. *See PG & E*, 103 S. Ct. at 1717-18; *see also* Nuclear Waste Policy Act of 1982, Pub. L. No. 97-425, 96 Stat. 2201 (——). Regarding the timing for developing sites to dispose permanently of nuclear wastes, the Nuclear Waste Policy Act requires the President to submit to Congress one recommended site for permanent disposal by March 1987, and a second recommended site by March 1990, but provides that the President may extend these deadlines by up to one year. *Id.* § 144(a)(2)(A), (B). Only after such sites have been recommended by the President may applications to construct disposal sites be made to the NRC. The NRC has up to four years to act upon a construction application. Pub. L. No. 97-425, § 114(b), (c). The time periods may be further extended by state or Indian tribe disapproval of the recommended site, followed by congressional action on the state's or tribe's disapproval. The Department of Energy has announced that it will be at least three years late in submitting recommended sites to the President. Stoler, *Pulling the Nuclear Plug*, TIME, Feb. 13, 1984, at 38. It thus appears likely that a permanent waste disposal site will not be ready until at least 1995.

70. *See PG & E*, 103 S. Ct. at 1717.

71. *Id.* The "clog" in the nuclear fuel cycle resulting from the unavailability of sites for the permanent disposal of wastes is one of a number of serious economic problems facing the nuclear industry. *See id.* at 1717-18. Shutdowns threaten negative economic consequences because a plant that is not operating does not generate electricity and creates a financial drain on the operator and ultimately on rate payers, bond holders or governmental bodies. *See generally Reassessment Report, supra* note 3, at 136-39. For a discussion of other economic problems, particularly the astronomical costs and cost overruns in the construction of nuclear reactors, see *infra* notes 254-62 and accompanying text.

affecting nuclear power also was spurred by criticism that the AEC had a fundamental conflict of interest in being both the regulator and the promoter of the nuclear power industry.[72] Responding to this criticism, Congress passed the Energy Reorganization Act of 1974,[73] abolishing the AEC and transferring its regulatory functions to the new Nuclear Regulatory Commission (NRC).[74] Although the NRC was formed from the regulatory arm of the AEC, Congress intended it to be an independent agency that would conduct "closely supervised regulation of the burgeoning nuclear power industry."[75] The mission of the NRC was to assure the safety and security of nuclear facilities and radioactive materials.[76]

The Energy Reorganization Act transferred the AEC's promotional functions to the Energy Resources Development Administration (ERDA).[77] In structuring the ERDA, Congress sought to prevent any possible pro-nuclear bias.[78] Unlike the AEC, the ERDA was chartered to promote the development of all energy sources—not just nuclear energy.[79] When Congress later abolished the ERDA and created the Department of Energy, it retained the emphasis on developing all energy sources.[80]

Congress recently enacted legislation to deal with the pressing problem of nuclear waste disposal. The Low-Level Radioactive Waste Policy Act,[81] passed in 1981, authorizes states, with congressional approval, to enter into regional agreements for the disposal of low-level radioactive wastes. The more ambitious Nuclear Waste Policy Act of 1982 directs the NRC to conduct studies and develop sites for the permanent disposal of high-level radioactive wastes.[82] Despite the complexity of the federal

72. *See* S. REP. NO. 980, 93d Cong., 2d Sess. 2-5, *reprinted in* 1974 U.S. CODE CONG. & AD. NEWS 5470; *see also* D. FORD, *supra* note 1, at 166.

73. Pub. L. No. 93-438, 88 Stat. 1233 (codified as amended at 42 U.S.C. §§ 5801-5879 (1982)). One purpose of the Act was to halt criticism that the AEC had a conflict of interest. *See* S. REP. NO. 980, *supra* note 72, at 2, *reprinted in* 1974 U.S. CODE CONG. & AD. NEWS, at 5471.

74. 42 U.S.C. §§ 5814(a), 5841 (1982).

75. S. REP. NO. 980, *supra* note 72, at 2, *reprinted in* 1974 U.S. CODE CONG. & AD. NEWS, at 5471.

76. *Id.*

77. *See* 42 U.S.C. §§ 5811, 5814 (1982).

78. Specifically, Congress sought "to ensure against an unwarranted priority being given to any energy technology . . . ." S. REP. NO. 980, *supra* note 72, at 7, 15, *reprinted in* 1974 U.S. CODE CONG. & AD. NEWS, at 5476, 5480. *See also* Pacific Legal Found. v. State Energy Resources Conservation & Dev. Comm'n, 659 F.2d 903, 927 (9th Cir. 1981).

79. 42 U.S.C. § 5801 (1982).

80. 42 U.S.C. §§ 7112, 7151 (1982). *See* Tribe, *supra* note 1, at 697-98.

81. Pub. L. No. 96-573, 94 Stat. 3347 (1981) (codified at 42 U.S.C. § 2021 (1982)).

82. Pub. L. No. 97-425, 96 Stat. 2201 (1983). Among the congressional findings contained in § 111(a) of the Nuclear Waste Policy Act are:

scheme to regulate nuclear energy, however, Congress left many areas open to state regulation.[83]

B. The Role of State Regulation

1. Early State Efforts

The states have never been excluded from the regulation of nuclear energy. Section 271 of the AEA, part of the original Act, provided that nothing in the AEA "shall be construed to affect the authority or regulations of any Federal, State or local agency with respect to the generation, sale or transmission of electric power produced through the use of nuclear facilities licensed by the Commission."[84] Although the legislative history of section 271 is meager,[85] it does indicate that Congress intended the production of electricity by nuclear plants to be subject to the same state regulatory authority as the production of electricity by non-nuclear plants.[86]

At the outset of the nuclear energy program, many states adopted regulations to protect their citizens against radiation hazards. By 1959, twenty-nine states had adopted measures of some kind relating to radiation safety and nuclear energy.[87] Of those, eighteen passed statutes specifically au-

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(1) radioactive waste creates potential risks and requires safe and environmentally acceptable methods of disposal;

(2) a national problem has been created by the accumulation of (A) spent nuclear fuel from nuclear reactors; and (B) radioactive waste . . . ;

3) Federal efforts during the past 30 years to devise a permanent solution to the problems of civilian radioactive waste have not been adequate . . . ;

. . . .

(7) high-level radioactive waste and spent nuclear fuel have become major subjects of public concern and appropriate precautions must be taken to ensure that such waste and spent fuel do not adversely affect the public health and safety and the environment for this and future generations.

Pub. L. No. 97-425, 96 Stat. at 2207. The Act sets a schedule for the development of waste disposal sites. *See supra* note 69. It also establishes a funding mechanism designed to require the operators of nuclear facilities generating the waste to bear most of the cost of its disposal. § 111(b)(4). The Act also provides for significant state authority in site selection and approval. *See infra* note 108 and accompanying text.

83. *See infra* notes 94-109 and accompanying text.

84. 42 U.S.C. § 2018 (1982).

85. *See PG & E*, 103 S. Ct. at 1724.

86. "We take the position that electricity is electricity. Once it is produced it should be subject to the proper regulatory body, whether it be the Federal Power Commission in the case of interstate transmission, or State regulatory bodies if such exist, or municipal regulatory bodies." 100 CONG. REC. 12,015 (1954) (statement of Sen. Hickenlooper, floor manager of the Senate bill), *quoted in* Pacific Legal Found. v. State Energy Resources Conservation & Dev. Comm'n, 659 F.2d 903, 920 (9th Cir. 1981).

87. *Federal-State Relationships in the Atomic Energy Field: Hearings Before the Joint Comm. on Atomic Energy*, 86th Cong., 1st Sess. 128 (1959) (statement of Lee M. Hydeman,

thorizing or directing the adoption of radiation safety regulations.[88] These laws generally applied to all radiation activity within a state; none recognized areas of exclusive federal jurisdiction.[89]

The flurry of state legislation affecting nuclear activities in the 1950's represented an effort by the states to perform what had been recognized as one of their established "police powers"—protecting the public's health and safety within their borders.[90] There is evidence that the states were aware of at least some of the serious health and safety hazards presented by nuclear power and sought to protect against them.[91] In addition, states were concerned about the uncertainty caused by the AEA in regard to their traditional role of regulating health and safety matters.[92] There is also evidence that, in some cases, state officials were distrustful of the AEC's willingness to afford the necessary level of protection.[93]

Co-director, Atomic Energy Research Project, Univ. of Mich. Law School) [hereinafter cited as *Atomic Energy Hearings*].

88. *Id.*

89. *Id.* at 129. Four states—Delaware, North Dakota, Wyoming and Minnesota—went so far as to require licensing, or its equivalent, of radiation activities within their borders. *Id.* at 129-30.

90. In Maurer v. Hamilton, 309 U.S. 598 (1940), a unanimous Supreme Court upheld a state highway safety law in an area regulated by the Interstate Commerce Commission, pursuant to federal statute, where the state law prohibited an activity that the ICC had found to be safe. Specifically, the state law prohibited automobile-carrying truck trailers that carried automobiles above the cab of the truck. *Id.* at 599-601. The ICC had concluded that these trailers were safe. *Id.* at 602. In upholding the state law, the Court repeatedly referred to the state's interest in protecting human life. *See also* California v. Zook, 336 U.S. 725 (1949) (in the absence of congressional intent to exercise exclusive jurisdiction, state may exercise its traditional police powers for the protection of health and safety even where state law is nearly identical to federal transportation regulation). *See generally* Note, *A Framework for Preemption Analysis*, 88 YALE L.J. 363-64, 372-75 (1978).

91. *See, e.g.*, *Atomic Energy Hearings*, *supra* note 87, at 322 (statement of Jo M. Ferguson, Attorney General of Kentucky and Vice Chairman, Committee on Atomic Energy Law of the National Association of Attorneys General); *id.* at 116-17 (statement of Governor Robert E. Smylie of Idaho, Chairman of the Governors Conference Special Comm. on Federal-State Relationships). In his statement, Governor Smylie said, "Since [1954] . . . the increasingly widespread use of radioactive materials... has become a source of concern to state and local government personnel responsible for the protection of the public health and safety." *Id.* at 116.

92. California Assembly Joint Resolution No. 15 Relative to Atomic Energy and Radiation Protection, April 1959, *quoted in* Letter from Governor Edmund G. Brown, Sr., to Senator Clinton P. Anderson, May 21, 1959, *reprinted in Atomic Energy Hearings, supra* note 87, at 479.

93. *See, e.g.*, Letter from T.O. Carver, M.D., Administrator of Health, Idaho Dep't of Health, to Senator Clinton P. Anderson, Feb. 18, 1959, *reprinted in Atomic Energy Hearings, supra* note 87, at 120.

2. Congressional Response to State Involvement

The states' activities in seeking to regulate nuclear power at an early date had a strong influence on the AEC and, in turn, on Congress. The AEC initially took a position highly favorable to state regulation of radiation hazards, but recognized a need for national legislation to coordinate the state measures with federal regulation.[94]

By 1959, although the AEC still favored a significant state role, it had become wary of conflicts and hazards which could arise if states were given too much regulatory authority or if they were given such authority prematurely.[95] Prompted by this concern, Congress enacted a bill, proposed by the AEC, that attempted to strike a balance between the strong interest of the states in assuring radiation safety and the AEC's primary role in safety-related regulation.[96] Section 274 of the AEA, still in effect, authorizes the AEC to enter into an agreement with the governor of any state, whereby the state assumes responsibility for regulating the less hazardous nuclear activities, including the radiation safety aspects of such conduct, while the AEC retains exclusive control over the more hazardous activities. Specifically, Section 274(b) authorizes the AEC to turn over the authority to regulate with respect to radioactive materials in quantities insufficient to form a critical mass.[97] Section 274(c) provides, however, that the Commission must retain responsibility for regulating the construction and operation of nuclear plants, ocean disposal of radioactive wastes, and

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94. *See Atomic Energy Hearings, supra* note 87, at 287-92 (statement of John S. Graham, Chairman of the Atomic Energy Commission). Chairman Graham stated before the Joint Committee on Atomic Energy:

> It has been our national tradition, particularly with respect to health and safety, that State and local governments should bear the primary responsibility in the absence of considerations requiring or justifying Federal activity . . . . We believe that radiation safety responsibilities in the atomic energy field should, insofar as possible, be allocated in the light of that experience.

Id. at 289.

95. *See Atomic Energy Hearings, supra* note 87, at 291, 302, 307.

96. *See* 42 U.S.C. § 2021 (1971); *Atomic Energy Hearings, supra* note 87, at 1-4, 288-89; *see also* S. REP. NO. 870, 86th Cong., 1st Sess 1, *reprinted in* 1959 U.S. CODE CONG. & AD. NEWS 2872.

97. 42 U.S.C. § 2021(b) (1982). A "critical mass" is the quantity of plutonium or other "special nuclear material" sufficient to initiate an atomic chain reaction. Section 274(b) provides specifically that the AEC may enter into agreements with states whereby the states are given authority over "source," "by-product," and "special nuclear materials" in amounts insufficient to form a critical mass. Pursuant to these agreements, the states may regulate, among other things, the radiation hazards that accompany such materials. Such agreements are referred to as "turnover agreements." "Source," "by-product," and "special nuclear materials" are defined in § 267 of the AEA, 42 U.S.C. § 2014 (1982).

international trade in nuclear materials and facilities.[98] Section 274(k) limits the effect of section 274(c) by providing that section 274 may not "be construed to affect the authority of any State or local agency to regulate activities for purposes other than protection against radiation hazards."[99] In other words, the requirement of exclusive federal control over such activities as plant construction and operation is subject to the qualification that states retain authority to regulate those activities for non-radiation safety purposes, including other aspects of health and safety.[100]

The legislative history of section 274 reveals that in establishing a mechanism for states to assume authority over certain radiation safety matters and in reserving nonradiation safety regulation to the states, Congress was responding to concerted pressure brought by state officials and legislators to give the states a clearly defined and important role in nuclear regulation.[101] The legislative history also indicates that when Congress passed section 274, it contemplated giving the states an even greater role in nuclear safety regulation at some point in the future.[102]

The role of the states in regulating nuclear energy was again addressed by Congress in 1977, when it passed amendments to the Clean Air Act.[103] Those amendments granted the states authority to regulate gaseous effluents from nuclear plants, including the radiation hazards of such effluents.[104] They specifically granted the states authority to set standards for radioactive emissions more stringent than those set by the federal govern-

98. 42 U.S.C. § 2021(c) (1982).

99. 42 U.S.C. § 2021(k) (1982). The legislative history of this statutory provision reveals that Congress intended to leave to the states the "authority to regulate activities of AEC licensee for the manifold health, safety, and economic purposes other than radiation protection." S. REP. NO. 870, 86th Cong., 1st Sess. 28, *reprinted in* 1959 U.S. CODE CONG. & AD. NEWS 2882.

100. *See PG & E*, 103 S. Ct. at 1732-33 (Blackmun, J., concurring).

101. The hearings before the congressional Joint Committee on Atomic Energy, concerning the 1959 amendments, involved extensive testimony and presentation of documentary evidence by officials from several states and organizations. *See Atomic Energy Hearings, supra* note 87, at 115-286, 321-50, 478-85. Many of the officials who testified expressed a strong desire for state involvement in nuclear energy regulation. *See, e.g., supra* notes 90-92 and accompanying text. In explaining the AEC's reasons for proposing the bill, Commissioner John Graham, referred to the great interest and activity the states had taken in nuclear energy regulation. *See Atomic Energy Hearings, supra* note 87, at 288.

102. *See Atomic Energy Hearings, supra* note 87, at 292.

103. Pub. L. No. 95-95, 91 Stat. 685 (1977) (codified as amended in scattered sections of 42 U.S.C.).

104. 42 U.S.C. § 7602(g) (1982). This provision added radioactive substances to the definition of "air pollutant" in the Clean Air Act. The Act already provided that states could impose stricter controls on air pollutants than those imposed by federal statutes. 42 U.S.C. § 7416 (1982).

ment.[105] The legislative history shows that Congress intended to displace a federal circuit court decision that precluded states from regulating radioactive effluents more stringently than the federal government on the basis that Congress had preempted the field of nuclear safety regulation.[106]

In 1980, Congress further clarified the role of the states in regulating nuclear energy by expressly authorizing them to set standards for siting and land use of nuclear facilities more stringent than the federal standards.[107] Finally, in the Nuclear Waste Policy Act of 1982, Congress provided for a powerful state role by giving each state the authority to reject any federally recommended site for the disposal of high-level waste within its borders.[108] Again, Congress apparently intended to recognize and accommodate the states' strong interest in participating in the regulation of nuclear activities.[109]

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105. 42 U.S.C. § 7416 (1982).

106. Joint Explanatory Statement of the Committee on Conference, H.R. REP. No. 564, 95th Cong., 1st Sess. 143 (1977). The decision disapproved of in the report was Northern States Power Co. v. Minnesota, 447 F.2d 1143 (8th Cir. 1971), *aff'd mem.*, 405 U.S. 1035 (1972). *See* discussion of *Northern States, infra* at notes 137-48, 233-34 and accompanying text.

107. NRC Authorization Act for Fiscal Year 1980, Pub. L. No. 96-295, 94 Stat. 780 (1980).

108. Pub. L. No. 97-425, § 116(b), 96 Stat. 2201 (1983). Section 115(c) provides that such state disapproval may be reversed only by an act of Congress. Section 117 requires the Department of Energy and the NRC to consult with the states and affected Indian tribes and to provide them with information regarding various phases of site selection, approval, construction and operation. The legislative history of the Nuclear Waste Policy Act indicates that Congress rejected a provision that would have made California's moratorium on plant construction ineffective by declaring that the Act itself satisfies any legal requirement for a means to dispose of nuclear waste. The legislative history also indicates that Congress did not intend to preempt state law. *See PG & E*, 103 S. Ct. at 1730.

109. The legislative history of the Nuclear Waste Policy Act reflects a desire on the part of Congress to provide "public and state participation in the program to assure that the political and programmatic errors of our past experience will not be repeated." H.R. REP. No. 491, 97th Cong., 1st Sess. 30, *reprinted in* 1982 U.S. CODE CONG. & AD. NEWS 3792, 3796. The mention of political errors is an apparent reference to political attacks in Kansas and Michigan against federal efforts to develop nuclear waste depositing sites in both of those states. H.R. REP. No. 491 at 27, *reprinted in* U.S. CODE CONG. & AD. NEWS at 3794.

At the same time that Congress has provided for a strong state role in directly regulating nuclear power, it has left state tort remedies for radiation injuries essentially intact. The $560 million cap on liability for a nuclear accident imposed by the Price-Anderson Act would necessarily modify the amount of recovery otherwise available under state law in the case of a major accident. *See supra* note 18 and accompanying text. However, when damages do not exceed the $560 million cap, the Price-Anderson Act would have no effect on state remedies. The Price-Anderson Act also requires operators of nuclear facilities to waive certain defenses that might otherwise be available to them in the event of an accident causing substantial off-site radiation damage. 42 U.S.C. § 2210(n) (1982). The effect of this provision is to expand claimants' remedies under state law by restricting the availability of defenses against their claims.

3. Recent State Regulation: The California Model

At the same time that states have entered into section 274 "turnover agreements" with the federal government, they also have continued to enact legislation and to promulgate regulations governing nuclear facilities and radioactive materials. In some cases, such regulations refer explicitly to health and safety, while in others they do not.[110]

In 1974, the California legislature passed a comprehensive energy statute—the Warren-Alquist Act,[111] which established siting and certification requirements for all types of electric power plants, including nuclear plants. The state's energy commission, empowered to perform the certification function, was required to evaluate and pass on a prospective plant's safety features, emergency procedures, and waste storage procedures before it could permit the construction of the plant.[112] The state commission also specifically was required to assess proposals to limit population density near nuclear plants.[113]

In 1976, the legislature amended the Warren-Alquist Act to impose a moratorium on the construction of new nuclear plants until a demonstrated method for permanent disposal of nuclear wastes had been developed and approved by the NRC.[114] The same amendment prohibited the state energy commission from certifying new nuclear plants without first determining that adequate waste storage facilities would be available when they were needed.[115]

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110. For example, California's Warren-Alquist Act, which establishes a comprehensive regulatory framework for nuclear and nonnuclear electric power plants, contains a number of provisions expressly referring to health and safety. *See infra* notes 111-20 and accompanying text.

111. CAL. PUB. RES. CODE §§ 25000-25950 (West 1977).

112. CAL. PUB. RES. CODE §§ 25000, 25511, 25512, 25519 (West 1977).

113. CAL. PUB. RES. CODE § 25511 (West 1977). The Act is silent as to what action the energy commission may or must take with respect to plans to control population density near nuclear plants.

114. CAL. PUB. RES. CODE § 25524.2 (West 1977). This provision also requires the state energy commission to report to the legislature its findings about the existence of and federal approval of a means for permanently disposing of wastes. The legislature may reject the commission's findings.

115. CAL. PUB. RES. CODE § 25524.1(b) (West 1977). The amendment provides, in § 25524.1(a), that no power plant requiring the reprocessing of fuel rods may be granted land use in the state until the federal government has determined that there exists a technology for the construction and operation of such plants. A plant that requires the reprocessing of fuel rods would be a special safety and security concern because such a plant would employ greater amounts of bomb grade fuels than are present in other nuclear plants. *See Reassessment Report, supra* note 3, at 58-61; *see also* Tribe, *supra* note 1, at 682-83. Subsequent to the enactment of the 1976 amendments, the state's energy commission found that the federal government had determined that nuclear weapons proliferation concerns relating to reactors requiring fuel rod reprocessing outweighed economic considerations, and that, in

Numerous other state measures to control nuclear activities include a Maine statute, patterned after California's, imposing a moratorium on the construction of new nuclear plants;[116] statutes enacted in Illinois[117] and Washington[118] severely restricting the disposal of nuclear wastes within their respective borders; a comprehensive energy regulation scheme in Oregon;[119] and a statutory attempt in Montana to overrule the Price-Anderson Act.[120]

II. REMAPPING STATE REGULATION OF NUCLEAR ENERGY: *PACIFIC GAS & ELECTRIC* AND *SILKWOOD*

A. Preemption Principles

The supremacy clause of the Constitution provides that the laws and

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any event, no technology for reprocessing existed. *See id.* Section 25524.3 of the Warren-Alquist Act requires the energy commission to complete a study on the necessity, effectiveness and feasibility of placing reactors underground or surrounding them with an earthen wall, in order to meet the health and safety requirements of other parts of the Act.

116. ME. REV. STAT. ANN. tit. 10, § 254 (1977).

117. ILL. REV. STAT. ch. 111 1/2, § 2301 (repealed 1982). The Illinois nuclear waste dumping statute was repealed following a decision of the United States Court of Appeals for the Seventh Circuit declaring the law unconstitutional on both preemption and interstate commerce grounds. *See* Illinois v. General Elec. Co., 683 F.2d 206, 215 (7th Cir. 1982); *see also infra* note 146 and accompanying text.

118. Radioactive Waste Storage & Transportation Act of 1980, Initiative Measure 383. The Washington Act was never codified because shortly thereafter it was declared violative of the supremacy and interstate commerce clauses of the Constitution. *See* Washington State Bldg. & Constr. Trades Council v. Spellman, 518 F. Supp. 928, 931 (E.D. Wash. 1981), *aff'd*, 684 F.2d 627 (9th Cir. 1982).

119. OR. REV. STAT. §§ 469.300-.621 (1981). The Oregon statute declares the intention of the state to exercise jurisdiction to the full extent of its constitutional ability. *Id.* It declares that the purpose of the statute is to protect the public health and safety. *Id.* The statute requires the state administering agency to adopt standards for the "siting, constructing, and operation of nuclear installations" that must take into account health and safety factors. *Id.* It requires state certification and monitoring. *Id.* §§ 469.320, 469.509. Further, it requires a state official to order the shutdown of a nuclear plant without prior hearing or notice if he has "cause to believe that there is clear and immediate danger to the public health and safety from continued operation of the plant." *Id.* § 469.550.

120. MONT. CODE ANN. § 75-20-1203 (1983). The Montana law provides that the state may not issue a certificate for the construction of any nuclear facility unless

> no legal limits exist regarding the rights of a person or group . . . to . . . recover full and just compensation from the owners and/or operators of a nuclear facility resulting from the . . . operation of the facility; and further that no legal limit exists regarding the total compensation which may be required from . . . the owners and/or operators of a nuclear facility.

It further provides that no nuclear facility may be certified until a state agency has approved the safety of all systems, and has determined that there is no reasonable chance that radioactive materials can escape in such a way as to cause damage to present or future generations. *See id.* § 75-20-1203(b), (c).

treaties of the United States "shall be the supreme law of the land."[121] If a state law conflicts directly with a federal law, so that compliance with both is impossible, the state law is preempted.[122] Moreover, a state law is preempted where it conflicts with a congressional intent to occupy the field affected by the law.[123] The preemption question is reached only if the federal law itself is constitutional.[124] Absent a direct conflict between state and federal law, the resolution of preemption questions depends upon congressional intent.[125] Where Congress intended in its legislation to accomplish certain purposes or objectives and the state law under review would obstruct their accomplishment, the state law is preempted.[126]

Even when there is no conflict in objectives and Congress has not clearly expressed its intent with respect to preemption, a state law will be preempted if it regulates in an area that Congress intended to be regulated exclusively by the federal government.[127] Such "occupation preemption" of a field can be inferred from factors such as the complexity and pervasiveness of the federal law[128] and whether the federal legislation involves an area of dominant federal concern.[129] Although the views of the United States Supreme Court regarding federal preemption have fluctuated in the past, recent Court decisions indicate a trend toward upholding state laws

121. U.S. CONST. art. VI. For a more detailed description of the preemption doctrine in the nuclear regulatory context, see Tribe, *supra* note 1, at 686-93.

122. *PG & E*, 103 S. Ct. at 1722; Florida Lime & Avocado Growers, Inc. v. Paul, 373 U.S. 132, 142-43 (1963).

123. *PG & E*, 103 S. Ct. at 1722; Rice v. Santa Fe Elevator Corp., 331 U.S. 218, 230-31 (1947).

124. *PG & E*, 103 S. Ct. at 1722. *See also* Tribe, *supra* note 1, at 688.

125. Thus, congressional intent is a key factor both in "occupation preemption" cases such as *Rice*, 331 U.S. 218 (1947), where it was alleged that Congress had occupied an entire field, and in "conflict preemption" cases such as Hines v. Davidowitz, 312 U.S. 52 (1941), where the type of conflict alleged was not the physical impossibility of complying with both state and federal standards, but the interference of the state statute with the purposes and objectives of Congress. *See* Tribe, *supra* note 1, at 688-89; *see also PG & E*, 103 S. Ct. at 1722-23 (citing *Rice*, 331 U.S. 218 (1947)).

126. *Hines*, 312 U.S. at 67 (state law requiring aliens to carry identification cards interfered with congressional purpose of obtaining sufficient information on aliens while not intruding on fundamental principles of freedom).

127. *PG & E*, 103 S. Ct. at 1722; *Rice*, 331 U.S. at 230. In *Rice*, the Court held that pursuant to its power to regulate interstate commerce, Congress intended the United States Warehouse Act to grant exclusive regulatory authority over warehouses licensed under the Act to the Secretary of Agriculture. 331 U.S. at 233-34. The Court based its holding on clear statutory language, noting in general that when Congress legislates in an area traditionally regulated by the states, preemption is not to be found "unless that was the clear and manifest intent of Congress." *Id.* at 230.

128. *PG & E*, 103 S. Ct. at 1722; *Rice*, 331 U.S. at 230. *See* Tribe, *supra* note 1, at 689.

129. *PG & E*, 103 S. Ct. at 1722; *Rice*, 331 U.S. at 230.

that are not clearly repugnant to federal law.[130]

To determine whether Congress meant the federal law to displace state law in an area traditionally dominated by state regulation, courts must "start with the assumption that the historical police powers of the States are not superceded by the Federal act unless that was the clear and manifest purpose of Congress."[131] Since the protection of the health and safety of residents is an area historically regulated by the states,[132] presumably a federal law in the same area does not displace state law, in the absence of either a direct conflict or a clear statement by Congress that it intended federal preemption.[133]

B. Nuclear Preemption Decisions of the Federal Circuit Courts

As noted earlier, the AEA leaves much room for state regulation of nuclear energy, including, at a minimum, such things as utility rate setting, plant siting, zoning, and determining the need for additional electric power plants.[134] There are few federal appellate decisions in which preemption of state regulation in these non-radiation safety areas has been an issue, probably because the validity of state authority is clear.[135] Serious questions of preemption have arisen, however, where state regulation arguably has either the purpose or the effect of controlling radiation safety.

Until the Supreme Court decided *Pacific Gas & Electric Co. v. State Energy Resources Conservation & Development Commission (PG & E)*,[136] the leading federal case in the area of nuclear regulation preemption was *Northern States Power Co. v. Minnesota*.[137] In that case the United States Court of Appeals for the Eighth Circuit held that state standards more stringent than federal standards governing the discharge of radioactive ef-

130. *See* Tribe, *supra* note 1, at 686-87 (citing, inter alia, Goldstein v. California, 412 U.S. 546, 555 (1973); Merrill Lynch, Pierce, Fenner & Smith v. Ware, 414 U.S. 117 (1973)).

131. *Rice*, 331 U.S. at 230. *See* Tribe, *supra* note 1, at 689-90 (asserting that, in general, congressional intent to occupy a field should not be found absent a "clear statement" by Congress).

132. *See* Head v. New Mexico Bd. of Examiners, 374 U.S. 424, 428-29 (1963); Maurer v. Hamilton, 309 U.S. 598, 600-11, 616 (1940). *See generally* Note, *supra* note 3, at 363-64, 372-75; *see also supra* note 90.

133. *See* Tribe, *supra* note 1, at 690-91.

134. *See supra* notes 84-86, 97-108 and accompanying text; *see also PG & E*, 103 S. Ct. at 1723-24 (noting the extent to which the states traditionally have regulated various economic aspects of electric power generation and asserting that Congress did not seek to interfere with such authority when it passed the AEA).

135. In Northern Cal. Ass'n to Preserve Bodega Head & Harbor, Inc. v. Public Util. Comm'n, 37 Cal. Rptr. 432, 390 P.2d 200 (1964), the Supreme Court of California found that the AEA does not preempt nuclear plant safety outside the radiation safety area.

136. 103 S. Ct. 1713 (1983).

137. 447 F.2d 1143 (8th Cir. 1971), *aff'd mem.*, 405 U.S. 1035 (1972).

fluents into the air were preempted by the AEA.[138] The court rejected Minnesota's argument that the state's traditional authority to protect public health, safety and welfare empowered it to regulate radioactive discharges.[139] The Eighth Circuit reasoned that although Congress had not expressly precluded state regulation of radioactive emissions, it nevertheless had manifested an intent to displace such regulation by establishing an extensive system of federal regulatory control over radiation hazards and by creating only limited exceptions to that control.[140]

Specifically examining section 274 of the AEA, the *Northern States* court concluded that Congress intended a section 274 turnover agreement to provide the only permissible state authority over radiation hazards.[141] It also perceived a conflict between the Minnesota effluence standards and the congressional intent, manifested in the introductory section of the AEA, to foster and encourage the development of nuclear energy.[142] If the states were permitted to set standards for radioactive discharges more stringent than those set by the federal government, the court reasoned, they might use such authority to stifle the development of commercial nuclear power.[143] The Supreme Court affirmed *Northern States* without opinion.[144]

Northern States established the proposition that the federal government has occupied the field of radiation safety, thus precluding state regulation in that area.[145] Various state and federal courts deciding nuclear regulation preemption questions after *Northern States* applied this principle.[146] In 1977, through amendments to the Clean Air Act, Congress legislatively overruled *Northern States* in providing that states may set standards stricter than federal standards governing radioactive effluence into the air.[147] Nevertheless, *Northern States* continued to be cited for the principle

138. 447 F.2d at 1153-54.
139. *Id.* at 1145.
140. *Id.* at 1147-53.
141. *Id.* at 1150.
142. *Id.* at 1153-54.
143. *Id.* at 1154.
144. 405 U.S. 1035 (1972).
145. *Northern States*, 447 F.2d at 1153-54.
146. *See, e.g.*, Washington State Bldg. & Constr. Trades Council v. Spellman, 684 F.2d 627, 630 (9th Cir. 1982) (statute regulating transportation of radioactive waste into the state void); Illinois v. General Elec. Co., 683 F.2d 206, 215 (7th Cir. 1982) (state law prohibiting disposal of nuclear wastes in the state preempted); Silkwood v. Kerr-McGee, 667 F.2d at 922; Cleveland v. Public Util. Comm'n, 64 Ohio St. 2d 209, 213, 414 N.E.2d 718 (1980) (state agency precluded from requiring state inspection and hearing prior to restarting nuclear plant).
147. Pub. L. No. 95-95, 91 Stat. 685 (1977) (codified as amended in scattered sections of 42 U.S.C.). *See supra* notes 103-06 and accompanying text.

of federal preemption in the nuclear safety field.[148]

C. *The Supreme Court Decisions:* Pacific Gas & Electric *and* Silkwood

1. *Preemption of Direct State Regulation:* Pacific Gas & Electric Co. v. State Energy Resources Conservation & Development Commission (PG & E)

Following passage of California's moratorium on the construction of new nuclear plants,[149] Pacific Gas & Electric Co., a public utility that had plans to build nuclear plants in the state, filed suit in the United States District Court for the Eastern District of California challenging the moratorium on preemption grounds.[150] The district court held that the federal scheme of nuclear regulation established under the AEA preempted the state law.[151] The United States Court of Appeals for the Ninth Circuit reversed, finding no conflict between California's statute and the intent of Congress.[152] Analyzing relevant provisions of the AEA, particularly sections 271 and 274, and relying on *Northern States*, the court determined that Congress had not intended to preempt state regulation of nuclear facilities for purposes other than promoting radiation safety.[153] In examining the legislative history of the California moratorium on nuclear plant construction, the Ninth Circuit determined that the legislation had an economic rather than a safety purpose.[154] It concluded that the state law did not intrude on the radiation safety field occupied by the federal government.[155] The court also addressed the argument that the state law conflicted with the objective of Congress to promote the commercial development of nuclear power. The court considered the relevant policy provisions of the AEA and determined that Congress did not intend to

148. *See supra* note 146.

149. CAL. PUB. RES. CODE §§ 25524.1-.3 (West 1977). *See supra* notes 111-15 and accompanying text.

150. The Pacific Gas and Electric Company alleged that the 1976 amendments to the Warren-Alquist Act, and other provisions of that Act, caused it to cancel plans for future nuclear plants. *See* Pacific Legal Found. v. State Energy Resources Conservation & Dev. Comm'n, 659 F.2d 903, 910 (9th Cir. 1981).

151. Pacific Gas & Elec. Co. v. State Energy Resources Conservation & Dev. Comm'n, 489 F. Supp. 699 (E.D. Cal. 1980). The district court invalidated not only the 1976 nuclear amendments, but also many other sections of the Warren-Alquist Act, holding that they were preempted by the AEA. *Id.*

152. Pacific Legal Found. v. State Energy Resources Conservation & Dev. Comm'n, 659 F.2d 903, 928 (9th Cir. 1981).

153. *Id.* at 925-28.

154. *Id.* at 925.

155. *Id.* at 922-25.

develop nuclear power "at all costs."[156] It also traced the history of federal legislation affecting nuclear power since the passage of the AEA and concluded that Congress no longer favored the development of nuclear power to the same extent that it did in 1954.[157] Accordingly, the court held that there was no conflict between congressional objectives and the state law.[158]

The Supreme Court affirmed, upholding the constitutionality of California's moratorium on the construction of new nuclear plants.[159] However, the Court also declared in sweeping language that the federal government had occupied the field of nuclear safety, preempting state regulation in that area.[160]

Writing for the majority, Justice White noted initially that there were both safety and economic aspects to the nuclear waste issue. He observed that the safety concern involved the possible danger to health and the environment resulting from disposal, while the economic concern centered on the possibility that reactors could be forced to shut down because of inadequate storage facilities.[161]

The Court noted that PG & E made three preemption arguments in urging reversal of the Ninth Circuit's decision: (1) the moratorium regulated the construction of nuclear plants and was based upon safety considerations, thereby invading matters reserved to the federal government by the AEA; (2) it conflicted with judgments made by Congress and the NRC on the nuclear waste issue; and (3) it frustrated the federal goal of promoting nuclear energy.[162]

Addressing the first argument, the Court pointed out that the AEA does not expressly prevent the states from banning the construction of nuclear plants within their borders.[163] The Court noted that even under the AEA as originally enacted, although Congress gave the federal government exclusive power to license the use of nuclear materials, it did not give the federal government authority to regulate the generation of electricity or to make economic decisions as to whether particular nuclear plants should be built.[164] Section 271, the Court determined, manifested Congress' intent to

156. *Id.* at 926.

157. *Id.* at 926-27.

158. *Id.* at 927.

159. 103 S. Ct. 1713 (1983). The moratorium provision, CAL. PUB. RES. CODE § 25524.2 (West 1977), was the only provision the Court found ripe for review. *See* 103 S. Ct. at 1720.

160. *Id.* at 1726-27. *See infra* note 167 and accompanying text.

161. *PG & E*, 103 S. Ct. at 1717-18.

162. *Id.* at 1722.

163. *Id.*

164. *Id.* at 1724.

reserve rate-setting and plant need questions to the states.[165]

In reviewing federal legislation following the 1954 Act, the Court noted that the 1959 amendments adding section 274 did not detract from state authority to plan for new plants and set rates.[166] It examined the mandate in section 274(c) that the NRC maintain exclusive control over plant "construction and operation" in light of the proviso in section 274(k) that state authority to regulate for purposes other than radiation safety is not affected. The Court concluded that

> Congress has preserved the dual regulation of nuclear-powered electricity generation: *the federal government maintains complete control of the safety and 'nuclear' aspects of energy generation*; the states exercise their traditional authority over the need for additional generating capacity, the type of generating facilities to be licensed, land use, rate making, and the like.[167]

Examining California's moratorium, the Court summarily disposed of the argument that the state law regulated the construction or operation of nuclear plants.[168] It rejected, however, California's argument that a state may prohibit new nuclear plants until safety issues are resolved by the federal government. The Court stated that "*the federal government has occupied the entire field of nuclear safety concerns, except the limited powers expressly ceded to the states* . . . . A state moratorium on nuclear construction grounded in safety concerns falls squarely within the prohibited field."[169]

Although at first blush this reasoning appears to settle the case in favor of the utility company, the *PG & E* Court went on to consider whether California had a nonsafety rationale for the moratorium.[170] It addressed the state's argument, accepted by the Ninth Circuit, that the moratorium was aimed at economic problems rather than radiation hazards. The Court referred to the Reassessment Report of the State Assembly Committee on Resources, Land Use and Energy.[171] That report expressed concern that the waste storage problem could clog the fuel cycle, resulting in high costs or even reactor shutdowns.[172] Quoting from the report, the Court noted that the waste disposal issue was considered by the committee as

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165. *Id.*

166. *Id.* The Court stated: "Indeed, the point of the 1959 amendments was to heighten the states' role." *Id.*

167. *Id.* at 1725-26 (emphasis added).

168. *Id.* at 1726.

169. *Id.* at 1726-27 (emphasis added).

170. *Id.* at 1727.

171. *See Reassessment Report, supra* note 3.

172. *PG & E*, 103 S. Ct. at 1727 (quoting *Reassessment Report, supra* note 3, at 18).

"largely economic or the result of poor planning, *not* safety related."[173] In accord with the Ninth Circuit's interpretation of the state law, the Supreme Court accepted California's economic rationale for the moratorium.[174] Thus, it concluded that the moratorium did not fall within the preempted field of nuclear safety regulation.[175]

Addressing PG & E's second argument—that the California moratorium conflicted with the judgment of Congress and the NRC that construction of new nuclear plants could proceed despite the waste disposal problem—the Court again found no basis for preemption.[176] It reasoned that Congress and the NRC had decided only that it was sufficiently safe to proceed with construction in view of the waste disposal problem, not that it was economically wise to do so.[177] Since California was operating in the economic realm, the Court concluded, its regulation was not precluded by the federal judgments.[178]

Finally, the Court addressed PG & E's third argument that the Califor-

173. *PG & E*, 103 S. Ct. at 1727 (emphasis in original).

174. *Id.* at 1727-28. It is doubtful whether the Court correctly interpreted California's purpose in imposing the moratorium. The legislative history of the nuclear laws indicates that radiation safety was clearly a major purpose of the moratorium and the other provisions of the amendments to the Warren-Alquist Act. Thus, the same legislative committee report relied on by the *PG & E* Court to show that the legislature had an economic purpose in imposing the moratorium also displayed deep concern with the safety aspects of the waste disposal dilemma. In its report, *Reassessment of Nuclear Energy in California: A Policy Analysis of Proposition 15 and Its Alternatives*, the Assembly committee that authored the nuclear amendments discussed extensively both safety and economic issues. Among the economic issues considered were the rapid increase in fuel cycle and construction costs in the nuclear industry, impending fuel shortages, and the potential adverse economic effects flowing from the absence of a permanent storage facility for nuclear wastes. *See Reassessment Report*, *supra* note 3, at 26-33. Among the safety issues considered were the risk of fuel transportation accidents, protection of bomb-grade fuels from theft, reactor safety problems, and the dangers inherent in storing and disposing of nuclear wastes. *Id.* at 41-69. The Report gave in-depth treatment to the safety hazards of nuclear reactors, documenting numerous mishaps at nuclear plants and criticizing the NRC's low estimate of the likelihood that a nuclear accident of major proportions would occur. *Id.* at 44-53. It also discussed in detail the health, safety and environmental concerns associated with waste disposal. *Id.* at 66-69.

The *PG & E* Court acknowledged that the "indicia of California's intent in enacting the [moratorium] are subject to varying interpretation." 103 S. Ct. at 1728. It cautioned, however, "that we should not become embroiled in attempts to ascertain California's true motive" because of the difficulty of ascertaining legislative intent, and because attempting to discern the true motive would be pointless "when it is clear that the states have been allowed to retain authority over the need for electrical generating facilities easily sufficient to permit a state so inclined to halt the construction of new nuclear plants . . . on economic grounds." *Id.*

175. *Id.*

176. *Id.* at 1729-30.

177. *Id.* at 1730.

178. *Id.*

nia moratorium on nuclear plant construction conflicted with the congressional objective of promoting the commercial development of nuclear power. It rejected the Ninth Circuit's suggestion that Congress no longer strongly favored the development of nuclear power,[179] noting that Congress had not changed the purposes and policies sections of the AEA setting forth the objective of promoting nuclear energy.[180] The Court also reasoned that by establishing the Price-Anderson Act's limits on liability for a nuclear accident, Congress had demonstrated a commitment to the development of commercial nuclear power.[181]

Again, although this reasoning seems to favor finding preemption, the Court continued by emphasizing the point made by the Ninth Circuit that development of nuclear energy was not to be promoted "at all costs."[182] It reasoned that the safety and licensing provisions of the AEA, as well as the continuation of state authority to choose between nuclear and other energy sources for economic reasons, demonstrate the limitations that Congress placed on the policy of fostering the growth of nuclear energy.[183] The Court concluded that the sharing of authority between the federal and state governments gives the states sufficient power to slow or halt the development of nuclear energy, and that any change in this division of power must come from Congress, not the courts.[184]

Justice Blackmun, concurring in part, argued that states have sufficient authority to prohibit the construction of nuclear plants for any reason.[185] He maintained that Congress has not occupied the entire field of radiation safety, but only the more limited area of radiation safety involving the construction or operation of nuclear plants.[186] He reasoned that the section 271 reservation of state authority to exercise traditional police powers

179. *Id.* at 1731. The Court asserted that "there is little doubt that a primary purpose of the Atomic Energy Act was, and continues to be, the promotion of nuclear power." *Id.* at 1730-31.

180. Quoting from 42 U.S.C. § 2013(b) (1982), the Court stated that a purpose of the AEA is "to encourage widespread participation in the development and utilization of atomic energy." 103 S. Ct. at 1731.

181. *Id.* at 1731. The Court noted that a stated purpose of the Price-Anderson Act was "to encourage the development of the atomic energy industry." *Id.* (quoting from 42 U.S.C. § 2012(i) (1982)).

182. 103 S. Ct. at 1731.

183. *Id.* at 1731-32.

184. *Id.* at 1732. While acknowledging the possibility of state interference with the congressional objective of promoting nuclear energy, the Court appeared to indicate that such interference would be permissible under the current statutory scheme: "[I]t is for Congress to rethink the division of regulatory authority in light of its possible exercise by the states to undercut a federal objective." *Id.*

185. *Id.* at 1732-35 (Blackmun, J., concurring in part and concurring in the judgment).

186. *Id.* at 1732.

with respect to nuclear energy implies that states have authority to decide against nuclear energy for a variety of reasons, including safety considerations.[187] If this were not the case, he argued, states would be forced to ignore the risks inherent in nuclear energy when choosing among energy sources.[188]

Justice Blackmun further maintained that a ban on nuclear plant construction because of safety concerns would not conflict with the congressional purpose of promoting the development of nuclear energy.[189] According to Justice Blackmun, the AEA was intended to develop nuclear energy technology at a time when none existed so as to make the nuclear option available to the states, not to force that option upon them.[190] Justice Blackmun also asserted that recent federal legislation affecting nuclear energy had demonstrated that Congress did not intend to preclude states from deciding against nuclear energy for safety reasons.[191] Specifically, he pointed to the Energy Reorganization Act of 1974, in which Congress separated the promotional and regulatory functions of the AEC, and to portions of the legislative history of that Act evincing congressional concern with a pro-nuclear bias in the federal energy program.[192] Finally, he noted a decision by the NRC holding that the 1977 amendments to the Clean Air Act gave the states sufficient latitude to prevent the construction of nuclear plants altogether.[193] Justice Blackmun concluded that Congress has reserved to the states the decision whether to build nuclear plants and has not precluded the states from basing that decision on safety factors, including the risks of nuclear catastrophe.[194]

2. *Preemption of State Tort and Similar Claims:* Silkwood v. Kerr-McGee Corp.

Although most cases involving an issue of federal preemption in the nuclear field have concerned the constitutionality of state statutes and regulations, courts also have been called upon to address the preemption question in situations in which private parties have sued the operators of nuclear facilities on state tort grounds.[195] The constitutionality question in

187. *Id.* at 1733.
188. *Id.*
189. *Id.* at 1734.
190. *Id.* at 1734-35.
191. *Id.* at 1734.
192. *Id.*
193. *Id.* at 1735 (citing Consolidated Edison Co. , 7 N.R.C. 31 (1978)).
194. 103 S. Ct. at 1735.
195. *See, e.g.*, Van Dissel v. Jersey Cent. Power & Light Co., 181 N.J. Super. 516, 438 A.2d 563 (App. Div. 1981). In *Van Dissel*, riparian landowners near a nuclear plant alleged

such cases is whether the remedy under state law is a form of "regulation" that Congress sought to preempt by federal legislation.

In *Silkwood v. Kerr-McGee Corp.*,[196] the Supreme Court addressed the question of allowing punitive damages to be awarded against the operator of a nuclear facility for radiation harm caused by plutonium that had escaped from its plant. Karen Silkwood was a laboratory worker and union representative at Kerr-McGee's plant near Crescent, Oklahoma, which manufactured plutonium fuel pins for nuclear reactors.[197] After Silkwood and other union representatives met with AEC officials about alleged safety violations at the plant, she undertook to document such violations.[198] During this assignment, Silkwood and her apartment were contaminated with plutonium produced at the Kerr-McGee plant. Several days later, on November 13, 1974, she died in an automobile accident.[199]

Silkwood's father brought suit against Kerr-McGee in the United States District Court for the Western District of Oklahoma seeking compensatory and punitive damages for injuries suffered by his daughter as a result of the plutonium contamination.[200] His claim was based on state tort law. Following a jury trial, the court awarded property damages of $5,000, personal injury damages of $500,000, and punitive damages of $10,000,000.[201] The United States Court of Appeals for the Tenth Circuit affirmed the award for the property damages, but denied the awards for personal injury and punitive damages.[202] In upholding the property damage award, the court rejected Kerr-McGee's preemption argument by noting that the Price-Anderson Act does not prohibit awards under state law for harm

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that heat and salinity resulting from the operation of the plant had caused an invasion of shipworms, destroying their docks. The court found that the change in water temperature was caused by the operation of the plant's cooling and waste discharge systems, which had been approved and licensed by the AEC, and, consequently, that the suit could not be maintained. *Id.* at 523, 438 A.2d at 567. *Compare* Marshall v. Consumers Power Co., 65 Mich. App. 237, 237 N.W.2d 266 (1975). In *Marshall*, the court found a state suit to declare a nuclear plant a nuisance was preempted as to those aspects of the alleged nuisance relating to radiation safety, but not as to those aspects such as the creation of fog and ice which were not directly related to radiation safety. The court further declared that a state court would have the power to enjoin the operation of a nuclear plant to abate a nonradiation nuisance. *Id.* at 259, 237 N.W.2d at 280.

196. 485 F. Supp. 566 (W.D. Okla. 1979), *aff'd in part, rev'd in part, and remanded*, 667 F.2d 908 (10th Cir. 1981), *rev'd and remanded*, 104 S. Ct. 615 (1984).

197. 104 S. Ct. at 617. *See supra* note 58.

198. 667 F.2d at 913.

199. *Id.* at 912.

200. 485 F. Supp. at 566.

201. 104 S. Ct. at 619.

202. 667 F.2d at 908.

caused by radiation.[203] It also cited the legislative history of that Act to the effect that such awards are permissible for claims resulting from relatively minor nuclear incidents.[204] However, the court held that federal law preempted the punitive damages award. It reasoned that punitive damages, unlike compensatory damages, are essentially regulatory, and that the AEA, as interpreted in *Northern States*, preempted state regulation of radiation hazards.[205] The court denied the award for personal injuries based on its determination that the Oklahoma Workers' Compensation Act provided the exclusive remedy.[206]

The Supreme Court, in a five to four decision, reversed with respect to the punitive damage award.[207] Writing for the majority, Justice White took as a starting point the conclusion in *PG & E* that "the federal government has occupied the entire field of nuclear safety concerns, except the limited powers expressly ceded to the states."[208] He then examined section 274 of the AEA and its legislative history, concluding that there was nothing in that statutory provision mitigating exclusive federal control over the more hazardous nuclear materials.[209] He determined, however, that the legislative history of the Price-Anderson Act cast a different light on congressional intent.

The Court noted that although the Price-Anderson Act did not apply directly to the case at bar,[210] its legislative history evidenced congressional intent to leave intact traditional state remedies for injuries caused by the operation of nuclear facilities except where specifically displaced by federal law.[211] It examined a 1966 amendment to the Act that permitted the AEC to require operators of nuclear facilities to waive certain state law defenses that might otherwise be available to them in lawsuits following major nuclear accidents.[212] After reviewing the legislative history, the Court concluded that the 1966 amendment was based on the assumption that state remedies for radiation injuries were available despite the exclusiveness of federal authority over safety in other respects.[213]

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203. *Id.* at 920-21.
204. *Id.* at 921.
205. *Id.* at 922-23.
206. *Id.* at 919-20.
207. 104 S. Ct. at 626.
208. *Id.* at 622 (quoting *PG & E*, 103 S. Ct. at 1726).
209. 104 S. Ct. at 622.
210. *Id.* at 623. Plutonium processing plants were not required to be covered by the financial protection provided for in the Price-Anderson Act until 1977, after the events in *Silkwood* had transpired. *Id.* at 623 n.12.
211. *Id.* at 623-25.
212. Pub. L. No. 89-645, 80 Stat. 891 (codified at 42 U.S.C. § 2210(n) (1982)).
213. 104 S. Ct. at 624-25.

Turning to Kerr-McGee's argument that there is a critical distinction between compensatory damages and punitive damages, and that at most Congress intended to leave the former intact, the Court noted that punitive damages are a traditional remedy under state tort law.[214] It reasoned that since Congress intended traditional tort law to apply unless specifically displaced, Kerr-McGee had the burden of showing that Congress intended to displace punitive damages. Kerr-McGee, the Court found, failed to meet this burden.[215]

The *Silkwood* Court acknowledged the tension between its conclusion that nuclear safety regulation is the exclusive province of the federal government and its conclusion that states may award damages under their own law to the victims of nuclear accidents.[216] The Court, however, determined that this tension had been created by Congress in enacting the AEA and the Price-Anderson Act, and that the Court must therefore defer to Congress' judgment in permitting such tension.[217] It then addressed the constitutional standard to determine whether state damage awards for radiation harm are preempted. Establishing a new standard for preemption of state damage awards, the Court stated that

> preemption should not be judged on the basis that the federal government has so completely occupied the field of safety that state remedies are foreclosed but on whether there is an irreconcilable conflict between the federal and state standards or whether the imposition of a state standard . . . would frustrate the objectives of the federal law.[218]

The Court applied this standard to determine whether an award of punitive damages conflicts with the federal scheme for remedying safety deficiencies, particularly in regard to the NRC's power to assess fines for violating safety regulations. The Court reasoned that awarding punitive damages does not conflict with the federal remedial scheme because it would not be impossible for the operator of a nuclear facility to pay both an NRC fine and a punitive damage award.[219] The Court next considered whether, as maintained by Kerr-McGee, an award of punitive damages conflicts with Congress' objective promoting the development of nuclear power. The Court cited a similar argument made in *PG & E*, and reiterated its conclusion there that Congress did not intend to promote nuclear

214. *Id.* at 625.
215. *Id.*
216. *Id.*
217. *Id.* at 625-26.
218. *Id.* at 626. *See* Florida Lime & Avocado Growers, Inc. v. Paul, 373 U.S. 132, 142 (1963).
219. 104 S. Ct. at 626.

energy at all costs but only to the extent consistent with public health and safety.[220]

Justice Powell, dissenting, cited the *PG & E* Court's conclusion that Congress has occupied the field of radiation safety except to the extent of authority expressly delegated to the states.[221] Noting that federal legislation contains no express delegation of authority to impose punitive awards, he maintained that the majority's conclusion that state punitive damage awards are exempt from preemption flies in the face of *PG & E*.[222]

In a separate dissent, Justice Blackmun emphasized what he perceived to be a further incongruity between *Silkwood* and *PG & E*.[223] He noted that *PG & E* held state regulation of nuclear energy to be preempted when its purpose is radiation safety, but not when its objective is the furtherance of state economic interests.[224] He asserted that because the purpose of the punitive damage award was to punish and deter the type of conduct that resulted in plutonium contamination, its purpose was the regulation of radiation safety.[225] Therefore, Justice Blackmun concluded, the punitive award, as opposed to a compensatory award, was prempted under *PG & E*.[226]

III. *PG&E* AND *SILKWOOD* IN PERSPECTIVE

The results that the Supreme Court reached in *PG & E* and *Silkwood* properly reflect broad state authority to regulate nuclear power. The Court, however, did not concede such authority in reaching its decisions. Rather, the Court stated that the federal government, with narrow exceptions, has occupied the field of nuclear safety regulation. This premise does not accurately reflect the intent of Congress. The premise is also inconsistent with residual state authority to protect and promote public health and safety where Congress has not expressed an unequivocal intent to displace state law. Moreover, the Court's premise arguably is inconsistent with public policy in view of the significant change in circumstances affecting nuclear energy since 1954.

A. The Scope of State Authority

Congress has not attempted to occupy the entire field of nuclear safety

220. *Id.* (citing *PG & E*, 103 S. Ct. at 1731).
221. 104 S. Ct. at 635 (Powell, J., dissenting).
222. *Id.* at 637-38.
223. *Id.* at 627 (Blackmun, J., dissenting).
224. *Id.* at 627-28.
225. *Id.* at 628.
226. *Id.* at 628-30.

regulation. Instead, it has given the states progressively more authority in that area. Even as originally enacted, the AEA did not expressly prohibit the states from regulating nuclear safety;[227] furthermore, since 1954, Congress has passed several pieces of legislation clarifying or expanding the states' role.

In passing the 1959 amendments to the AEA, Congress sought to accommodate the states' interest in regulating radiation hazards.[228] Section 274 was designed to strike a balance between this strong state interest and the federal government's interest in having a national scheme for nuclear safety regulation.[229] Moreover, although Congress heard extensive testimony about the express measures many states had taken to regulate radiation safety, it chose not to invalidate such measures. This evidence suggests that Congress intentionally left the permissible scope of state regulation an open question to be decided later by the courts.[230]

In subsequent legislation, Congress defined more clearly a broad scope of permissible state safety regulation. In 1977, Congress gave states the authority to set standards for gaseous radioactive effluents more stringent than the federal standards.[231] In so doing, Congress overruled *Northern States*,[232] which at that time was the leading case in the area of nuclear regulation preemption. *Northern States* stood for the broad proposition that Congress had occupied the field of nuclear safety regulation.[233] There is evidence in the legislative history of the 1977 Clean Air Act amendments that the overruling of *Northern States* was intentional.[234] It must be concluded that at least by 1977 Congress itself had rejected the proposition that with minor exceptions it had given exclusive control over nuclear safety to the federal government. Subsequent federal statutory provisions giving states authority over nuclear plant siting,[235] and low-level[236] and

227. *See supra* notes 84-86 and accompanying text.

228. The states manifested their interest by passing legislation relating to radiation safety. *See supra* notes 87-89 and accompanying text.

229. *See supra* notes 94-100 and accompanying text.

230. *See* Tribe, *supra* note 1, at 696-97.

231. *See supra* notes 103-06 and accompanying text.

232. Northern States Power Co. v. Minnesota, 447 F.2d 1143 (8th Cir. 1971), *aff'd mem.*, 405 U.S. 1035 (1972).

233. *See supra* notes 137-44 and accompanying text.

234. The House-Senate Conference Report accompanying the bill which became the 1977 amendments to the Clean Air Act noted that the bill would permit states to set stricter standards for radioactive air emissions than the federal standards, and commented, "Thus the provision . . . would not follow the holding of Northern States Power Co. v. State of Minnesota . . . ." Joint Explanatory Statement of the Committee on Conference, H.R. REP. NO. 564, 95th Cong., 1st Sess. 143 (1977), *quoted in* Tribe, *supra* note 1, at 699.

235. *See supra* note 107 and accompanying text.

236. *See* Low-Level Radioactive Waste Policy Act, 42 U.S.C. § 2021 (Supp. V 1981).

high-level[237] radioactive waste disposal underscore the extent to which Congress has deferred to the strong state interest in regulating nuclear safety.[238]

When Congress legislates in an area traditionally regulated by the states, there is a strong presumption that it does not displace state law absent clear and unambiguous intent.[239] Since the protection of health and safety is an area traditionally regulated by the states,[240] an ambiguous expression of congressional intent should not be construed to displace state law. The legislative history of the AEA and its amendments, as discussed above, arguably indicates that Congress did not intend to occupy the field of nuclear safety regulation. At the very least, the legislative history throws Congress' intent into doubt. In light of this ambiguous expression of congressional intent, the courts should not strip the states of their authority to regulate in the field of nuclear safety.[241]

Even conceding the Court's premise in *PG & E* and *Silkwood* that the federal government has occupied the field of nuclear safety regulation, the Court's reasoning arguably is faulty. The purpose of federal occupation of a field is to prevent state intrusion or state interference with exclusive federal control in that field.[242] Thus, under the rubric of "occupation preemption," state laws governing matters that are also governed by federal law have been held unconstitutional.[243] Yet neither the *PG & E* nor the *Silkwood* decision has the effect of keeping the states out of the radiation safety field.

Irrespective of the stated purposes of California's moratorium on nuclear plant construction, one consequence that the law will have is the reduction in radiation hazards, thereby intruding on the assertedly occupied field. The *PG & E* Court, however, declared that the statute was valid because of its economic purpose.[244] Even if the Court's interpretation of

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The Act provides that each state is responsible for making available either within or without its borders facilities for the disposal of low-level radioactive waste and authorizes states to enter into regional compacts for the provision of such facilities. 42 U.S.C. § 2021d(a)(1), (2) (1982).

237. *See supra* note 108 and accompanying text.

238. *See supra* notes 107-09 and accompanying text.

239. *See supra* note 131 and accompanying text.

240. *See supra* note 132 and accompanying text.

241. *See generally* Tribe, *supra* note 1, at 689-90.

242. *See* City of Burbank v. Lockheed Air Terminal, Inc., 422 U.S. 624, 639 (1973) (municipality precluded from restricting take-off and arrival times at airport in view of congressional intent to vest exclusive control in the Federal Aviation Administration).

243. *Id.*

244. *PG & E*, 103 S. Ct. at 1726, 1728. *See supra* notes 170-75 and accompanying text.

the purpose of the California law is correct,[245] the distinction that it draws between purpose and effect is precarious ground on which to decide the constitutional issue.[246] If this distinction were applied strictly, a state law identical to California's moratorium and having precisely the same effect would nevertheless be deemed unconstitutional if its acknowledged purpose were the obvious one of promoting radiation safety.

In *Silkwood*, it is even clearer that the application of state law upheld by the Court intrudes on the field of radiation safety regulation. The punitive damage award upheld by the Court had both the purpose and the intended effect of punishing and deterring the type of conduct that caused radiation injuries.[247] The *Silkwood* Court recognized the "tension" between the proposition that Congress had occupied the radiation safety field and the finding that traditional state remedies for radiation harm were unaffected by federal law, but asserted that Congress intended to tolerate such incongruity.[248] This, however, is also a tenuous basis on which to decide the constitutional issue, for it is logically inconsistent. If, as the Court found, Congress intended state remedies for radiation injuries not to be preempted, this fact casts considerable doubt on the Court's major premise that Congress intended to occupy the field of radiation safety.[249]

Thus, in both *PG & E* and *Silkwood*, the Court's reasoning is fundamentally flawed. Even accepting the Court's premise that Congress has occupied the radiation safety field, neither decision effectuates the purpose of such occupation. Further, in *Silkwood*, the Court's finding that Congress did not intend to displace state tort remedies in fact vitiates the premise that Congress has occupied the radiation safety field.

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245. *See supra* note 174.

246. The difficulty with the Court's distinction is highlighted by the legislative history of the Maine nuclear plant construction moratorium, discussed *supra* note 116, which shows a legislative purpose to induce the federal government to act on the waste disposal problem. *See* Me. Legis. Record, Senate, June 13, 1977, at 1609. The distinction between economic purposes and safety purposes drawn by the *PG & E* Court gives little guidance as to the constitutionality of the Maine statute, which had neither an economic nor a radiation safety purpose.

247. Indeed, as the *Silkwood* Court noted, the jury that awarded punitive damages against Kerr-McGee was instructed that punitive damages are "for the sake of example and by way of punishment." 104 S. Ct. at 619. In his dissent, Justice Blackmun pointed out that the punitive damage award has a purpose and effect of regulating nuclear safety. *Id.* at 628-30. *See supra* notes 224-26 and accompanying text.

248. *Silkwood*, 104 S. Ct. at 625. *See supra* notes 216-17 and accompanying text.

249. As discussed earlier, there are also other strong indicia that Congress has not intended to occupy exclusively the field of radiation safety. *See supra* notes 227-38 and accompanying text.

B. Changes in the Circumstances Affecting Nuclear Energy Justify a Strong State Regulatory Role

At the inception of the nuclear energy program in 1954, it was assumed that nuclear power would be both safe and inexpensive.[250] These underlying assumptions have proved to be false. Thus, the balance of perceived benefits versus perceived risks in developing nuclear power has shifted dramatically over the past thirty years. Further, since the nuclear energy industry is now well-established, it does not require the kind of federal government assistance that it needed originally to get off the ground.

As noted earlier, health, safety and environmental problems associated with the operation of nuclear plants and the disposal of nuclear wastes were not seriously considered when the AEA was originally passed.[251] They have, however, become prominent in the public view, particularly in the wake of the Browns Ferry and Three Mile Island accidents.[252] It is apparent that many of these problems, including some of the most serious, remain unsolved.[253] Moreover, the safety problems are compounded by severe economic problems.

Far from producing electricity "too cheap to meter," nuclear power in many cases has proved too expensive to be worthwhile.[254] In recent years, plans for numerous plants in various stages of design and construction have been cancelled due to cost overruns.[255] In large measure because of the costs, not a single new nuclear plant has been ordered in the United States since 1978.[256] The reasons for the astronomical costs involved in nuclear plant construction are complex. Among the factors contributing to higher costs are lack of standardization in plant design, poor project management and workmanship, and new safety system requirements imposed by the NRC since the Three Mile Island accident.[257] The higher costs, in turn, have in some cases substantially raised utility rates.[258] In other cases,

250. *See supra* notes 40, 47 and accompanying text.

251. *See supra* note 47 and accompanying text.

252. *See supra* notes 59-65 and accompanying text.

253. The permanent disposal of high-level radioactive waste is one of the most serious of the unsolved problems. *See supra* notes 67-72 and accompanying text. Certain reactor safety problems also remain unsolved. *See* D. FORD, *supra* note 1, at 231-34; *see also* Stoler, *Pulling the Nuclear Plug*, TIME, Feb. 13, 1984, at 36 (noting continuing reactor safety problems including cracked steam pipes and emergency system electrical failures).

254. *See* Stoler, *supra* note 253, at 34-35.

255. *Id.* A recent study showed that 36 of 47 nuclear plants surveyed cost at least twice as much as originally estimated, while 13 cost at least four times as much. *Id.* at 39.

256. *Id.* at 35.

257. *See id.* at 36-38.

258. Customers of Long Island Lighting Co., who already have the highest electric bills in the United States, face a possible 40% increase in those bills to cover the $4 billion cost of

such costs have had a serious negative effect on the utility bond market.[259]

Another change in the economic circumstances affecting nuclear power is a dramatic decrease in the projected demand for electricity. In the ten years prior to 1979, electricity demand in the United States rose an average of 7% per year.[260] In 1980, it rose only 1.7%; in 1981, .3%. In 1982, it decreased for the first time since World War II.[261] As a result, electric utilities now have a substantial excess in generating capacity. Consequently, the need for power produced by nuclear plants is much less than anticipated. This is another factor contributing to the recent cancellations of plants.[262]

The state of the nuclear power industry has also changed since the enactment of the AEA. That statute was intended to foster the development of a nonexistent industry.[263] Since 1954, that industry has developed rapidly, with eighty-two nuclear power plants now in operation.[264] Consequently, the congressional purpose of assisting in the development of a nuclear energy industry has been accomplished. There is no longer a danger that state controls on nuclear energy will prevent fulfillment of that purpose.

The fundamental changes in the circumstances affecting nuclear energy since the program was initiated thirty years ago have been reflected in federal legislation giving less weight to nuclear energy and greater weight to other energy sources,[265] and in federal legislation giving the states increasing power to regulate nuclear energy.[266] These federal statutes demonstrate a markedly decreased congressional commitment to nuclear power development, which, in turn, reflects a growing sentiment among the public that nuclear energy is too costly and too dangerous to be developed further.

In light of this drastically altered balance of benefits versus risks, the *PG & E* Court's analytical approach arguably is ill-founded from a public policy standpoint. The Court developed the dual premises that Congress had

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constructing a nuclear plant. The projected $4 billion cost is 15 times the original estimate. *Id.* at 39.

259. In July 1983, the Washington Public Power Supply System defaulted in payments on $2.25 billion of municipal bonds issued to raise funds for the construction of nuclear reactors. This default was the largest municipal bond failure in history and had a depressing effect on the utility bond market. *See id.* at 34-35.

260. *See id.* at 36.

261. *Id.* at 37.

262. *Id.*

263. *See supra* note 43 and accompanying text.

264. *See* Stoler, *supra* note 253, at 35.

265. *See supra* notes 77-80 and accompanying text.

266. *See supra* notes 94-109, 228-38 and accompanying text.

preempted nuclear safety and favored further development of nuclear power, but created exceptions to these rules large enough to sustain a state's moratorium on nuclear plant construction.[267] It may well be that, in fashioning such broad exceptions, the Court was moved by the social, economic and political changes that have occurred over the past thirty years with respect to nuclear power.[268] The better analytical approach therefore would have been to recognize the magnitude of these changes and to acknowledge that whatever the situation was in 1954, the balance has now shifted so as to make it eminently reasonable to permit states wide authority in regulating nuclear power to further their legitimate interests.

C. The Future of Nuclear Energy Regulation

Despite broad preemption language, *PG & E* and *Silkwood* give the states extensive authority to regulate nearly all aspects of nuclear power, including radiation safety. In both cases, this is apparent from the nature of the state law that the Court upheld—an absolute prohibition on the construction of new nuclear plants for an indefinite period in *PG & E*, and punishment for radiation injuries in *Silkwood*. That the law sustained in each case has an effect on nuclear safety is obvious.

The *PG & E* Court's "purposes" versus "effects" distinction also represents a concession that the states have broad authority to regulate nuclear safety.[269] The Court admits that states are not precluded from enacting regulations that have an effect on nuclear safety, so long as they have an economic or other nonsafety purpose.[270] Yet, the Court dilutes even the requirement of a nonsafety purpose by stating that only a "rationale" other than radiation safety is needed to sustain the state law.[271] Thus, the true message of *PG & E* appears to be that states can do virtually whatever they choose in the area of regulating nuclear energy, including banning it outright, so long as they credibly put forth reasons other than radiation

267. *See supra* notes 166-84 and accompanying text.

268. Supreme Court decisions concerning nuclear power handed down prior to the accident at Three Mile Island displayed great deference to the NRC in its safety and environmental judgments. *See* Yellin, *High Technology and the Courts: Nuclear Power and the Need for Institutional Reform*, 94 HARV. L. REV. 489, 493-94 (1981). It is clear that with its decisions in *PG & E* and *Silkwood*, the Court is no longer willing to unquestioningly or uncritically accept the NRC's judgment on such issues. This is evident from the *PG & E* Court's acknowledgement that serious safety concerns underlie the waste disposal issue, 103 S. Ct. at 1720, and the *Silkwood* Court's holding that the existence of a remedial scheme for safety violations administered by the NRC does not preclude the states from imposing damage awards for radiation injuries. 104 S. Ct. at 626.

269. *See PG & E*, 103 S. Ct. at 1727-29.

270. *See supra* notes 161-75 and accompanying text.

271. 103 S. Ct. at 1727. *See supra* notes 170-74 and accompanying text.

safety.[272]

If *PG & E* leaves states free to enact legislation substantially affecting nuclear safety as well as other aspects of nuclear energy, what remains of federal preemption in this area? First, it is axiomatic that if a state law conflicts directly with a federal law, it will be preempted irrespective of its purpose.[273] Thus, for example, if a federal regulation required electrical wires in a nuclear reactor to be composed of certain materials in stated proportions, a state could not effectively require the plant to have wires composed of other materials or in different proportions. Second, there are certain narrow areas that the AEA reserves for control exclusively by the federal government including ocean disposal of radioactive materials, international trade in nuclear products, and the radiation safety aspects of plant construction and operation.[274] In effect, these are narrowly circumscribed areas of "occupation preemption."[275]

In the area of tort remedies, *Silkwood* gives states even broader authority than *PG & E* gives in the area of regulatory statutes. The *Silkwood* Court repeated the premise of *PG & E* that Congress had occupied the field of nuclear safety regulation, but concluded that traditional state remedies for radiation injuries should be measured by whether they actually conflict with federal law, not by whether they intrude on an area occupied by federal law.[276] Thus, state remedies for radiation injuries, whether or not such remedies are founded upon a radiation safety purpose, will not be preempted unless they conflict directly with federal law. It appears that a direct conflict with the AEA will only occur where a nuclear catastrophe has resulted in claims exceeding the $560 million liability limit.[277] Thus, after *Silkwood*, federal preemption of state tort remedies appears to be limited to a type of situation that has never arisen.

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272. There is little in the majority's opinion in *PG & E* to suggest that a state could not constitutionally exclude nuclear plants from its territory or force existing ones to shut down so long as the state had supportable economic reasons for doing so. Indeed, the Court's citation to an NRC decision holding that states could set levels for radioactive effluents into the air so low as to prevent the operation of nuclear plants suggests that the Court acknowledged such a possibility. *See* 103 S. Ct. at 1735. The legitimacy of a state's asserted economic rationale might be more open to question in the case of an absolute ban on nuclear power. The extent to which the *PG & E* Court chose to ignore evidence that California had a safety purpose in imposing its moratorium on construction of new plants, however, makes it doubtful that the Court would scrutinize closely a state's avowed economic purpose in other situations. *See supra* note 174 and accompanying text.

273. *See* Florida Lime & Avocado Growers, Inc. v. Paul, 373 U.S. 132, 142-43 (1963).

274. *See* 42 U.S.C. § 2022(b) (1982).

275. *See supra* notes 125-31 and accompanying text.

276. *Silkwood*, 104 S. Ct. at 626. *See supra* note 221 and accompanying text.

277. *See supra* notes 157-62 and accompanying text.

In *PG & E* and *Silkwood*, the Supreme Court enunciated a rule of sweeping federal preemption in the nuclear safety area, but upheld application of state laws that had a substantial impact on nuclear safety. The seeming contradictions inherent in *PG & E* and *Silkwood* are certain to cause confusion among state decisionmakers, federal regulators, potential parties to lawsuits, and judges. A Supreme Court decision such as *PG & E* that can be cited for nearly opposite propositions (the federal government has exclusive authority over nuclear safety, but states may enact laws affecting nuclear safety if they have an economic rationale) is bound to engender wasteful legislative wrangling, litigation, and state-federal friction. One forseeable practical result of such legal conflict and uncertainty is that utility companies having nuclear plants in the planning stages will have greater difficulty in reaching a rational decision about whether to proceed with construction. Further, although the ultimate effect of *PG & E* is to give states authority to pass laws dealing with radiation safety, it is equally clear that the state legislatures cannot *say* that radiation safety is what they are regulating. This invites subterfuge—passing radiation safety laws disguised with an economic or other nonsafety rationale.[278]

The confusion and conflict that are likely to arise from the dicta in *PG & E* and *Silkwood* to the effect that Congress has occupied the field of nuclear safety and has not deviated from its goal of promoting nuclear power can be avoided. Congress should take the lead in limiting the effect of the Court's pronouncements, especially because the Court's broad premise conflicts with previously expressed congressional intent, residual state power, changed circumstances, and the very results reached by the Court in the two cases.

By amending the AEA, Congress may eliminate the substantial social and economic costs that are likely to result from the contradictions in the *PG & E* and *Silkwood* decisions. Such an amendment should provide expressly that states have authority to regulate nuclear materials and facili-

278. As discussed at *supra* note 174, there is evidence that California itself had a strong radiation safety motive in passing the moratorium on nuclear plant construction and the other 1976 amendments to the Warren-Alquist Act. The legislative report that details extensively the safety-related problems of nuclear energy also indicates that the legislature was concerned with possible preemption if it passed a measure for the stated purpose of regulating radiation safety. *See Reassessment Report*, *supra* note 3, at 126-29. The inference may be drawn that although the legislature was deeply concerned with the safety aspects of nuclear energy, as well as the economic aspects, it intentionally couched the language of its conclusory remarks in economic terms to avoid preemption problems. It was the conclusory language of the report, stating a predominantly economic purpose, on which the Supreme Court relied in accepting the state's economic rationale for the moratorium. *See PG & E*, 103 S. Ct. at 1727-28.

ties in furtherance of their legitimate interests, including safeguarding health and safety and protecting the environment from radiation hazards, so long as their laws do not conflict directly with federal law or intrude upon the narrow areas reserved by section 274 of the AEA for exclusive federal control.[279] Such an amendment should also clarify the meaning of section 274's requirement that the NRC must retain exclusive authority over radiation safety aspects of plant construction and operation, since that provision has been a source of much confusion.[280] Specifically, the amendment should provide that the NRC has sole authority to promulgate and enforce safety-related construction specifications and operating procedures, but that the states are free to regulate the radiation-related effects of plant construction or operation on the people, land, air, water and chattels within the state.

Amending the AEA appears to be the only appropriate way at this point in history to bring an end to the twenty-five year conflict between the states and the federal government over the regulation of nuclear power. The Supreme Court had an opportunity to resolve much of the conflict in the *PG & E* and *Silkwood* cases, but it failed to do so. Since the Court's reasoning in both cases rested on statutory interpretation rather than Constitutional requirements, Congress is free to clarify what the Court left unresolved—the extent to which the states may exercise their traditional police powers to protect the environment and the public from the extraordinary hazards of nuclear power generation. By amending the AEA to provide expressly for broad state authority, Congress can assure that the states will continue to exercise their legitimate police powers within the context of the states' proper role in the federal system.

Under an amendment of the kind proposed, a state would be free to enact legislation explicitly to reduce or eliminate radiation hazards. It would be free to set standards more stringent than federal standards not only with respect to gaseous effluents but also with respect to liquid effluents, radiation exposure of people and animals, and radiation levels in the soil. It also would be free to limit population density in the vicinity of nuclear plants, to determine routes over which radioactive materials would be transported, and to regulate the disposal and storage of radioactive wastes within its borders. A state would not be permitted to establish spec-

279. *See supra* note 98 and accompanying text.

280. The provision was given a narrow construction in *PG & E*. *See* 103 S. Ct. at 1726. The Court, however, did not state its reasons for narrowly construing the language in § 274 relating to construction and operation of nuclear facilities. Other courts construing the provision have given it a much broader scope. *See, e.g.*, Van Dissel v. Jersey Cent. Power & Light Co., 181 N.J. Super. 516, 438 A.2d 563 (App. Div. 1981).

ifications and procedures dealing with such matters as valve type, wire composition, control room instrumentation and personnel where such matters are governed in detail by federal regulations. A state, however, could require modifications in construction specifications or operating procedures by setting strict standards for the radioactive effects of nuclear plant operation.

The proposed amendment would do no more than to conform express statutory law to the powers that have already been given—implicitly—to the states to regulate nuclear power. At the same time, it would conform statutory law to the changes that have occurred over the past thirty years concerning realization of the safety and environmental hazards of nuclear energy and its economic costs. The advantage of such a measure is that it would foreclose the confusion and conflict that are likely to result from the Supreme Court's reasoning in *PG & E* and *Silkwood.*

IV. Conclusion

States have a vital interest in protecting their inhabitants from the extraordinary hazards to health, safety and the environment posed by nuclear materials and facilities. It is within the historically recognized police powers of the states to further such important interests through appropriate regulation. Although Congress may limit historic police powers of the states, it will not be presumed to have done so in the absence of clear and unambiguous intent. In the case of nuclear power regulation, although Congress has created a complex regulatory scheme, it has not manifested an intent to exclude the states from nuclear health, safety and environmental regulation. To the contrary, in accordance with public sentiment and changed circumstances, it has provided for a substantial and increasing state role.

Although *PG & E* and *Silkwood,* in sustaining state actions that had a regulatory effect on nuclear safety, are in accord with congressional intent and sound public policy, the general rule of federal preemption in the nuclear safety area enunciated by the Supreme Court is not. The decisions therefore are likely to engender confusion among state legislators, federal and state regulators, potential parties to lawsuits, and attorneys and judges presented with questions of federal preemption in the field of nuclear safety. To eliminate this confusion, Congress should amend the Atomic Energy Act to provide expressly that states have authority, concurrent with that of the federal government, to regulate all aspects of nuclear power

including radiation safety, except where such state regulation would conflict directly with federal law.

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